

ANC

POPULAR MECHANICS

MAC

WRITTEN S

REGD. TRADE MARK, GREAT BRITAIN, NO. 410426



SILVER TEAL



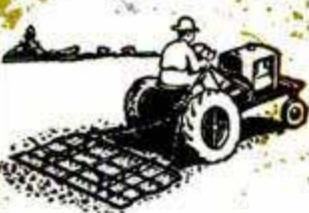
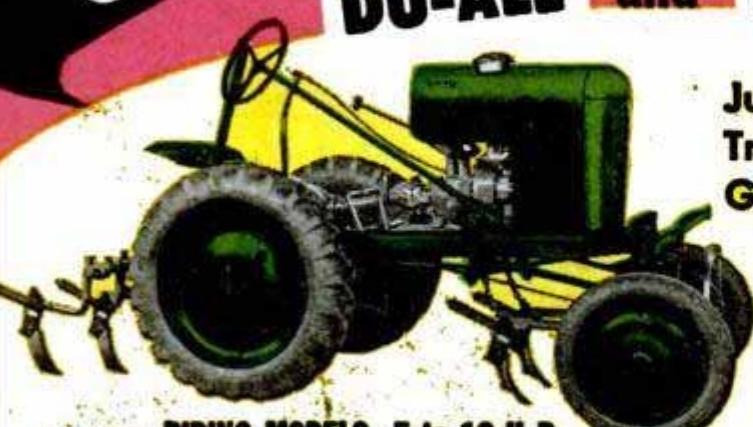
Beginning a
GREAT NEW FEATURE—
What Owners Really Think
About Their Cars

*See page 118**In This Issue*

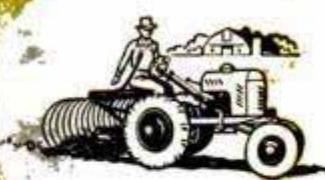
THE NASH RAMBLER

Do Scores of Hard Jobs the Quick, Easy Way, COST LESS TO BUY--COST LESS TO OWN

Famous **SHAW** **DU-ALL** and **PEPPY-PAL** **TRACTORS**



HARROW



RAKE

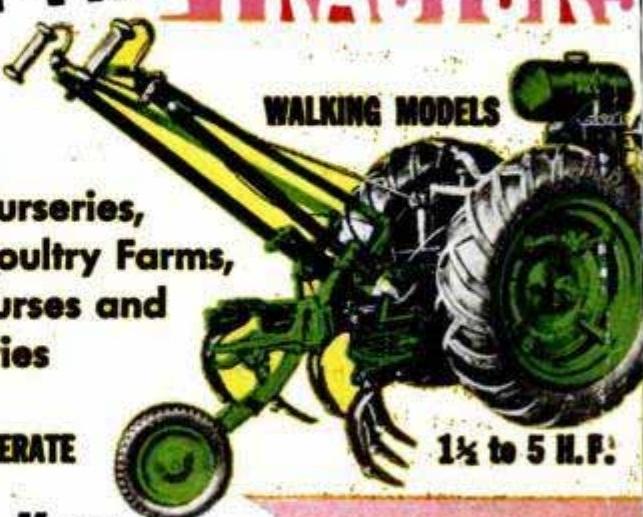


BULLDOZE and PLOW SNOW

The SHAW Saws Wood, Grinds Feed and Does Many Belt Jobs

Just the Tractors for Gardens, Nurseries, Estates, Poultry Farms, Golf Courses and Cemeteries

EASY TO OPERATE



In Use Throughout the Nation and in Many Foreign Lands... Saving TIME, MONEY and WORK!

Right now is the time to plan ahead... plan to do your work easier, in less time and at less cost this year. Plan to get a famous SHAW Tractor... the machine that does scores of hard jobs the quick, easy, better way! No other investment will pay you better dividends year after year.

TRIED AND PROVED RIGHT! For nearly a half-century SHAW Tractors have proved their value throughout the Nation and in foreign countries. They are built right... to do the job right... with quality materials and expert engineering. Equipped with high-grade air-cooled gasoline or oil engines. You get a full year guarantee against any defect in material or workmanship. They serve faithfully for many years.

LOW-COST DEPENDABLE WORKERS—SHAW Tractors have proved dependable, versatile, low-cost helpers on scores of jobs...ideal workers on small farms, in gardens, truck farms, nurseries, orchards, cemeteries, golf courses, poultry farms and estates. Great for plowing, cultivating, discing, seeding, harvesting, spraying, mowing; operate cutter bars and lawn mowers. Riding tractors with bulldozer also used in foundries and by building contractors for moving sand, dirt, etc. For power on belt jobs... sawing wood, pumping water, grinding feed and running belt machinery. First cost is low and low operating cost will surprise and please you.

EASY TO OPERATE—You'll find a SHAW "Peppy Pal" or "Du-All" Tractor just fitted to your needs... 1 1/2 to 12 H.P. And you'll find that a SHAW will do things a big tractor can't. Easy to operate by elderly persons, boys and girls. Easy to change from one piece of equipment to another. We can supply many attachments at low prices.

GET FULL DETAILS—Get all the facts and you'll get a SHAW! Plan now to do your hard jobs the easy way. Have a SHAW Tractor to do a better job... easier and quicker. It will serve you well... it will give you years of satisfactory, trouble-free, willing service...at amazingly low cost. Many dealers throughout the U. S. sell SHAW Tractors. See them... see their many great, exclusive features. In the meantime, fill out and mail coupon for FREE folders, prices, etc. Get all the SHAW Facts now!



PLOW



MOW



CULTIVATE

**FILL OUT,
CLIP and MAIL
COUPON**

FREE FOLDERS and PRICES

SHAW MANUFACTURING CO.

4501 Front St., Galesburg, Kans., or 668-G N. 4th St., Columbus,

Send me Free Folders and Prices on SHAW Tractors.

NAME _____

ADDRESS _____



Dear Folks:

You can save yourself some dough and maybe get out from under a big repair bill if you'll drive right down to your motor specialist and ask to see his Danger Zone Book.

This book takes all the mystery out of car repairs—shows what the parts look like, what they cost, what the charge for installing them will be. And—most important—the book shows what you can save by having repairs done when first needed.

If you'd like to have a special edition of this Danger Zone Book to study in your own home, just send a postcard or letter to DANGER ZONE, HASTINGS, MICHIGAN. There's no charge. Just say: "Send me your Danger Zone Book."

Tough Guy

WARNING ZONE

Engine loses pep . . .



DANGER ZONE 1

Engine begins to smoke . . .



DANGER ZONE 2

Engine pumps oil badly . . .



DANGER ZONE 3

Destructive wear sets in . . .



Needs a tune-up

Clean, adjust and re-time ignition. Clean fuel supply and carburetor screens. Adjust carburetor. Adjust tappets and fan belt. Check compression and vacuum readings for symptoms of ring wear.

Needs new piston rings and minor engine repairs

- Replace piston rings. Align rods. Adjust rods or replace rod bearings. Reseat and reface valves.
- Tune engine.
- These repairs are comparatively inexpensive and put the engine back in peak condition for thousands of economical miles. Delay puts the engine in Danger Zone 2.

Needs new piston rings and major engine repairs

- Replace piston rings. Replace piston pins. Adjust—probably replace—main bearings. Align rods. Adjust rods or replace rod bearings. Reseat and reface valves. Tune engine.
- These repairs naturally cost more than those needed in Danger Zone 1, but they put the engine back in condition for thousands of additional miles of satisfactory service. Delay leads to costly Danger Zone 3.

Needs new piston rings and complete overhaul

- Repairs cost three or four times as much as in Danger Zone 1.
- Remove engine. Re bore cylinders. Replace pistons, pins, rings. Replace main bearings. Align rods, refit or replace rods, or replace rod bearings. Overhaul valve lifters, rocker arms. Replace timing chains or gears. Reseat, reface valves. Replace guides and springs. Replace camshaft bearings. Clean oil lines. Overhaul oil pump.
- Clean, re-install and tune engine.

HASTINGS

MANUFACTURING COMPANY
HASTINGS, MICHIGAN
HASTINGS LTD., TORONTO

STEEL-VENT PISTON RINGS

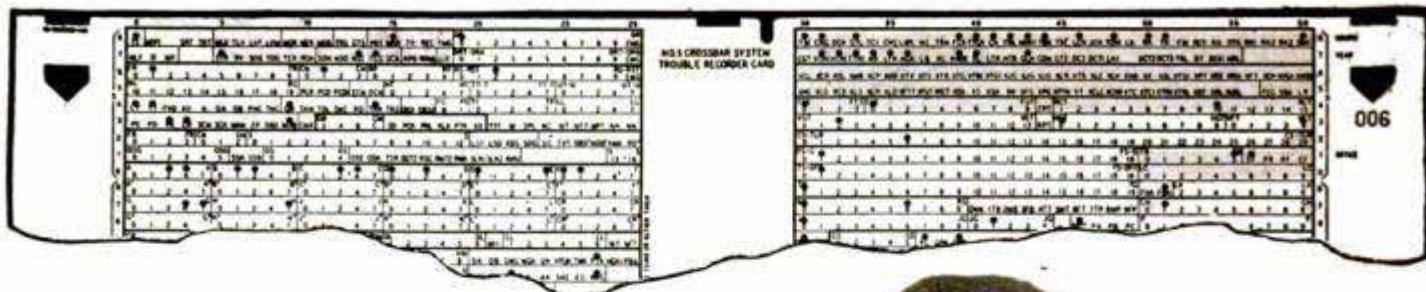


TOUGH on Oil-Pumping • GENTLE on Cylinder Walls

GET YOUR CAR OUT OF THE

DANGER ZONE

THE MORE YOU DELAY
THE MORE YOU PAY!



Another reason why your telephone gives so much for so little

Studying punched card record of dial system operation. Each card (top) can report 1080 items.



In a large, modern dial telephone office, 2,000,000 switch contacts await the orders of your dial—and 10,000 of them may be needed to clear a path for your voice when you make a single telephone call. Within this maze of signal paths, faults—though infrequent—must be detected and fixed before they can impair telephone service.

The latest system developed by Bell Telephone Laboratories automatically detects its own faults, detours calls around them without delay—then makes out a "written" report on what happened.

The fault may be a broken wire, or a high resistance caused by specks of dirt on switch contacts. In a second, the trouble recorder punches out a card, noting the circuits involved and the stage in the switching where the fault appeared.

Maintenance men examine the reports at intervals and learn what needs attention. Between times they go about their own duties in keeping service moving.

This is another example of how research at Bell Laboratories helps your telephone serve you at top efficiency—and low cost.



BELL TELEPHONE LABORATORIES

*WORKING CONTINUALLY TO KEEP YOUR TELEPHONE
SERVICE BIG IN VALUE AND LOW IN COST.*

Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

H. H. WINDSOR, JR., Editor and Publisher



this month's cover

PLUNGING TOWARD EARTH from a perch nearly eight miles high, at a speed of more than 180 miles an hour, is an experience Air Force Capt. Vincent Mazza describes on page 118. His world-record drop was from 42,176 feet. With five other volunteers, all experienced parachutists, Mazza was a guinea pig in tests to find the safest way to make high-altitude emergency bail-outs. Lofty heights aren't new to the 33-year-old captain, who was once a pole vaulter at North Central College in Illinois. Since completing 30 combat missions in Europe, his main assignment has been with Wright Field's Aero-Medical Laboratory. There his innate curiosity and professional air skill have teamed to provide a very satisfying career. As special-project engineer on the pilot-ejection seat, he allowed himself to be "shot" from a jet plane flying more than 550 miles an hour. Instrument-laden chairs were used in the latest tests so that jumpers could give play-by-play reports en route

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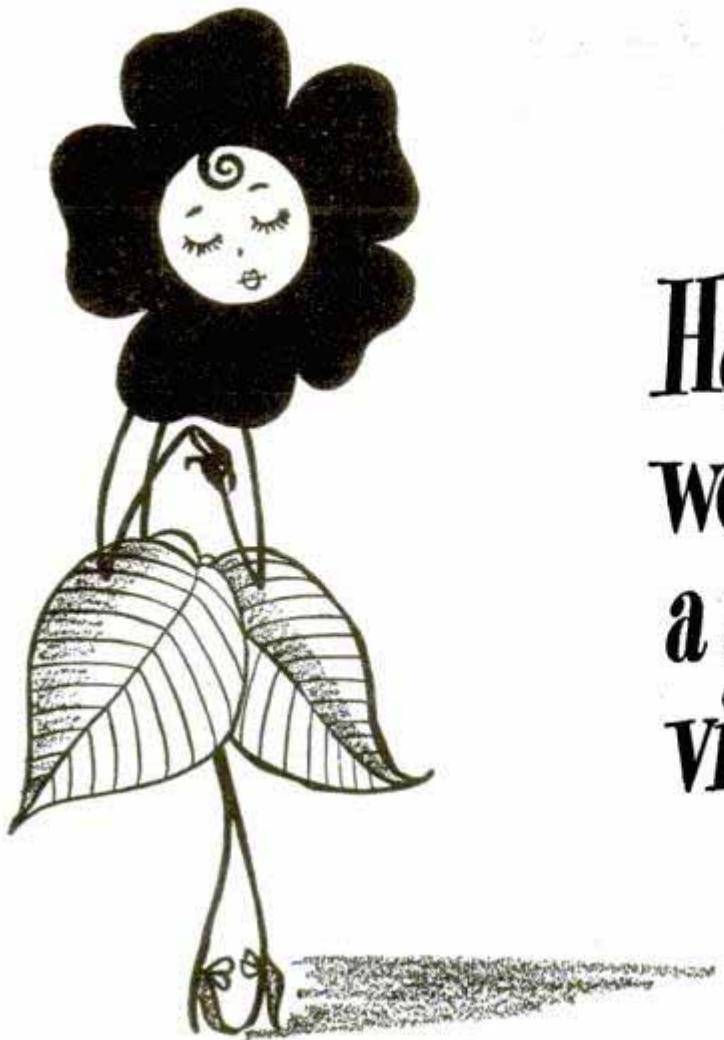
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Other items, and manufacturers of available products described, are listed on pages 14, 16 and 18



Honestly now— would you prefer a shrinking violet?

The advertisers in this magazine all claim their products are "tops." They are full of pride in their brand names.

Every so often you meet someone who objects to what he calls the "boastfulness" of advertising, but *most* of us Americans like it.

We like it because we know that deep *pride* in things well made goes way back into the factories and is reflected in the fine products we have to choose from when we go to buy the things we use in our homes or on our persons.

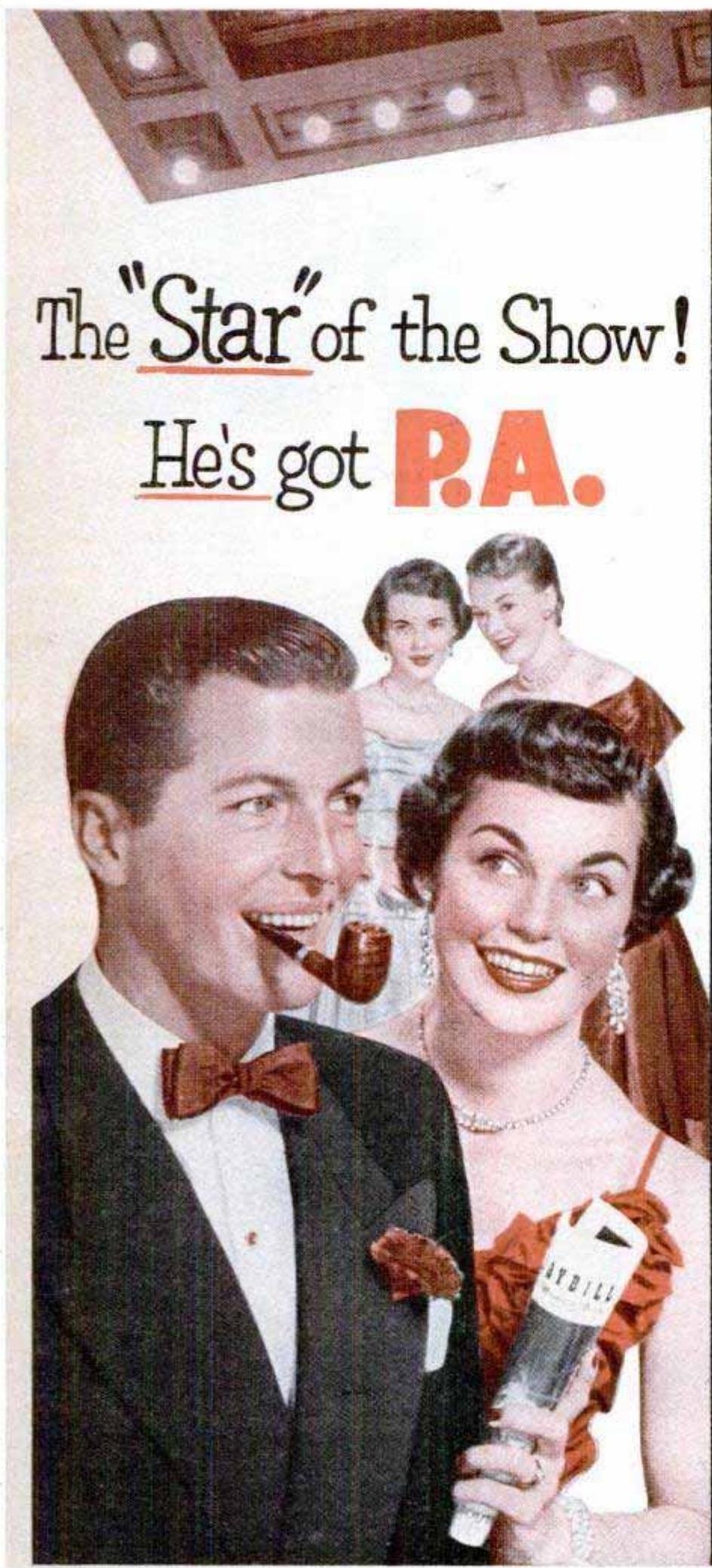
We like it because we know that pride is a spur to make better merchandise; and that it is the driving power that keeps men striving each to outdo the other in new ideas, new and better ways of doing things. The end result is a steady stream of new and better means to make life comfortable; more and better jobs for us to earn the means of buying them.

We will take the *Proud* ones—and let some other land cultivate the shrinking violets.

Brand Names Foundation
INCORPORATED

A non-profit educational foundation

• 119 West 57th Street, New York 19, N. Y.



The "Star" of the Show!

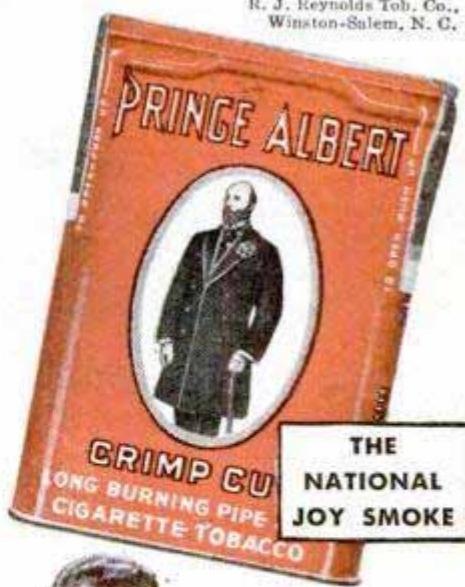
He's got **P.A.**

P.A. means
PIPE
APPEAL
and
PRINCE
ALBERT

• Yes! He's the "star" of the show for her! He's got Pipe Appeal! And the tobacco that stars with pipe smokers is crimp cut Prince Albert — America's largest selling smoking tobacco.

Try P. A.! You'll enjoy the natural fragrance of Prince Albert's choice, rich-tasting tobacco — specially treated to insure against tongue bite.

R. J. Reynolds Tob. Co.,
Winston-Salem, N. C.



"GRAND FOR
ROLLING YOUR
OWN CIGARETTES
TOO!"

PYROIL

is a "must" with low viscosity oils

You're perfectly right to use low viscosity oils for winter driving. It helps you to "easy starts." But the running temperature of your engine is the same winter and summer.

That's why Pyroil is the perfect companion for winter oil. When your car is standing in the damp and cold, winter oil quickly drains off, exposing piston rings and cylinder walls to excessive rust and corrosion. Pyroil causes even low temperature oil to cling to exposed metal surfaces. This prevents scoring due to pumping, damaging "dry starts"—costly wear and tear. Pyroil keeps winter lubrication at a summer level.

Add Pyroil to winter oil—add miles to your car.

Pyroil for Aircraft Engines

Use Aircraft Pyroil B for lubricating oil,
Aircraft Pyroil A for gasoline.

GIVEN!

An attractive Pyroil metal savings bank, takes coins up to 50c pieces. MOTORISTS, it's yours for the asking — sent postage paid.

Manufactured and Guaranteed by Pyroil Company, 111 Pyroil Bldg., La Crosse, Wisconsin.

Canadian Distributors: Central Purchasing Agencies, Ltd., Toronto, Ontario



PYROIL COMPANY

111 Pyroil Bldg., La Crosse, Wisconsin

I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

Name _____

Address _____

City or Town _____ State _____



in this corner..... THE EDITORS



Letter to the Editor

Sir:

On page 164 of your issue for June 1950 there is an article entitled "Covered-Wagon Ferry Restored in Wyoming." This article is of considerable interest to me as the officer-in-charge of Kumba Division in the Territory of the Cameroons, under United Kingdom Trusteeship, in which three car ferries are maintained by the Native Administration. These ferries are worked entirely by hand, African labour being solely employed.

I should be most grateful if you could obtain for me complete details of the Snake River ferry ... with plans and photographs as I wish to experiment with a similar ferry here.

You will agree that it would be of more than local interest if a replica of an historic American ferry were to be constructed in this territory . . .

C. H. Croasdale,
District Officer,
Kumba Division,
Territory of the Cameroons.

Through the courtesy of Mr. Harold P. Fabian, Vice-President and General Manager of the Jackson Hole Preserve, Inc., Moran, Wyo., blueprints, photographs and field drawings of the ferry have been airmailed to Mr. Croasdale and African river crossings may soon be made on a copy of the famous old Snake River ferry.

Letter from a Roving Editor

Dear Boss:

Pardon the pencil, but my pen is in a suitcase some three or four miles back in the tail section of this massive hunk of airplane. It's a brand new Boeing C-97A, making its maiden voyage.

"It's the trip during which we find out

(Continued to page 8)



IF you're that man, here's something that will interest you.

Not a magic formula—not a get-rich-quick scheme—but something more substantial, more practical.

Of course, you need something more than just the desire to be an accountant. You've got to pay the price—be willing to study earnestly, thoroughly.

Still, wouldn't it be worth your while to sacrifice some of your leisure in favor of interesting home study—over a comparatively brief period? Always provided that the rewards were good—a salary of \$4,000 to \$10,000?

An accountant's duties are interesting, varied and of real worth to his employers. He has *standing*!

Do you feel that such things aren't for you? Well, don't be too sure. Very possibly they *can* be!

Why not, like so many before you, investigate LaSalle's modern Problem Method of training for an accountancy position?

Just suppose you were permitted to work in a large accounting house under the personal supervision of an expert accountant. Suppose, with his aid, you studied accounting principles and solved problems day by day—easy ones at first—then more difficult ones. If you could do this—and could turn to him for advice as the problems became complex—soon you'd master them all.

That's the training you follow in principle under the LaSalle Problem Method.

You cover accountancy from the basic Principles right up through Accountancy Systems and Income Tax Procedure. Then you add C. P. A. Training and prepare for the C. P. A. examinations.

As you go along, you absorb the principles of Auditing, Cost Accounting, Business Law, Statistical Control, Organization, Management and Finance.

Your progress is as speedy as you care to make it—depending on your own eagerness to learn and the time you spend in study.

Will recognition come? The only answer, as you know, is that success *does* come to the man who is really *trained*. It's possible your employers will notice your improvement in a very few weeks or months. Indeed, many LaSalle graduates have paid for their training—with increased earnings—before they have completed it! For accountants, who are trained in organization and management, are the executives of the future.

Write For This Free Book

For your own good, don't put off investigation of *all* the facts. Write for our free 48-page book, "Accountancy, The Profession That Pays." It'll prove that accountancy offers brilliant futures to those who aren't afraid of serious home study. We'll also include "Ten Years' Promotion in One"—a book which has helped many men. Send us the coupon now.

**LASALLE EXTENSION
CHICAGO 5, ILL.**

Over 3200 Certified
Public Accountants among
LaSalle alumni

Other LaSalle Opportunities

- Higher Accountancy
- C.P.A. Coaching
- Bookkeeping
- Law: LL.B. Degree
- Business Management
- Salesmanship
- Traffic Management
- Foremanship
- Industr'l Management
- Stenotypy
- (Machine Shorthand)

LASALLE EXTENSION UNIVERSITY

A CORRESPONDENCE INSTITUTION

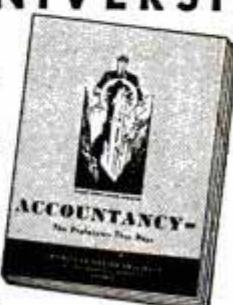
417 S. Dearborn St. Dept. 164HR Chicago 5, Ill.

I want to be an accountant. Send me without obligation, "Accountancy, the Profession that Pays"—also "Ten Years' Promotion in One."

Name.....Age.....

Address.....

City, Zone & State.....



This One



AVIATION TRAINING



A MESSAGE TO YOUNG MEN... AND PARENTS

We have an urgent demand for Embry-Riddle graduates. Aircraft manufacturers and operators need thousands of properly trained young men for essential positions in civilian aviation.

SAVE TIME

Now, more than ever before, you need maximum school training in minimum time. Embry-Riddle offers complete eight-month to two-year aeronautical engineering, master A & E mechanic, flying and specialist courses, backed by a quarter-century experience in training today's aviation leaders.

BE PREPARED

No one can safely predict the course of events today. Be assured, however, that no matter what happens, you will be one step ahead of the crowd with up-to-date, intensive Embry-Riddle aviation training. Write, wire or call today for catalog and full information.



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International
SCHOOL OF AVIATION
RIDDLE-MCKAY COLLEGE OF AERONAUTICS
MIAMI 30, FLORIDA

Wherever planes fly, men know Embry-Riddle...
A Famous Name in Aviation.

Dean of Enrollments - Dept. 99
Embry-Riddle School of Aviation
Miami 30, Florida

Please Print

NAME _____

ADDRESS _____

CITY _____

STATE _____ AGE _____

I am interested in...

- A&E. Mechanic
- Commercial Pilot
- Engineering
- A&E. Combined with Commercial Pilot
- Flying Mechanic
- Drafting & Design

Check One Veteran Non-Veteran

TRAIN IN MIAMI--AIR CAPITAL OF THE WORLD

(Continued from page 6)

if she's good enough to make it," according to the pilot, a very cheerful fellow. "If we don't, there's nothing to worry about. She'll float like a cork—unless I bust her up when we ditch."

Up in front where I'm sitting with three pilots, two navigators and seven other crew members who take turns sleeping and running around flipping switches (it takes 12 men to run this monster), I am surrounded by blue sky and ocean. There's more window area in this nose than there is in a greenhouse. It's like flying around on a wing tip—I keep crouching back and clutching at things to keep from falling off.

We're on the way, 1800 miles out over the Pacific, and four hours to go before we settle down on Hickam Field. Only had an 18-hour visit at Fairfield-Suisun Air Force Base, which gave me enough time to recuperate (from six medical hypodermic shots in the arm). There's a 12-hour stop in Honolulu. Then, instead of going down to Guam, Johnston, etc., this super plane will make a beeline for Tokyo with a possible stop at Wake Island.

We just witnessed a staggeringly beautiful sunset, which I photographed in color. Now I'm going to nestle in a stretcher and take a nap so I'll be real spry when we set down about midnight...

Dick

This intimate note from our Eastern editor, Richard F. Dempewolff of New York, was written as he began his trip on a cargo-laden Stratocruiser to Tokyo. Part II of his story, illustrated in full color, appears on page 97.



"Hot Foot" for Ice

Seems as though every winter somebody comes up with a new way to get rid of snow and ice. This year's entry is a jet-powered

(Continued to page 10)

NOW!



Industry needs *trained* men—needs them **NOW!**

Can you qualify for the premium jobs that are open to trained draftsmen, machinists, technicians?

You can, if you start preparing yourself immediately. And the International Correspondence Schools can help you.

Just mark and mail the coupon below. We'll rush you full information about practical, easy-to-understand I. C. S. Courses—courses being used by many defense industries to train their own workers.

The time for action is **NOW!**

INTERNATIONAL CORRESPONDENCE SCHOOLS



BOX 5691-K, SCRANTON 9, PENNA.

Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X:

Air Conditioning and Plumbing Courses

- Air Conditioning
- Heating
- Refrigeration
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- Pulp and Paper Making
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- Building Estimating
- Civil Engineering
- Coal Mining
- Contracting and Building
- Highway Engineering
- Lumber Dealer
- Reading Structural Blueprints
- Sanitary Engineering
- Structural Drafting
- Air Conditioning
- Plumbing
- Steam Fitting
- Plastics

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- Electrical Drafting
- Electrical Engineering
- Electric Light and Power
- Lighting Technician
- Practical Electrician
- Internal Combustion Engines Courses
- Auto Technician
- Diesel-Electric
- Diesel Engines
- Aeronautical Engineer's, Jr.
- Aircraft Drafting
- Forging
- Heat Treatment of Metals
- Industrial Engineering
- Industrial Instrumentation

Industrial Metallurgy

- Machine Shop
- Mechanical Engineering
- Mold-Loft Work
- Patternmaking—Wood, Metal
- Reading Shop Blueprints
- Sheet-Metal Drafting
- Sheet-Metal Worker
- Ship Drafting
- Tool Designing
- Toolmaking
- Welding—Gas and Electric
- Air Brake
- Diesel Locomotive
- Locomotive Engineer
- Locomotive Fireman
- Locomotive Machinist
- Railroad Section Foreman
- Steam-Diesel Loco. Eng.
- Stationary Eng'r'g Courses
- Boilermaking
- Combustion Engineering
- Engine Running
- Marine Engineering
- Power Plant Eng'r'
- Steam Engr.

Textile Courses

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- Loom Fixing
- Textile Designing
- Woolen Manufacturing

Business and Academic Courses

- Accounting
- Bookkeeping
- Business Administration
- Bus. Correspondence
- Certified Public Accounting
- Commercial
- Cost Accounting
- Federal Tax
- Foremanship
- Good English
- Higher Mathematics
- Industrial Supervision
- Motor Traffic
- Retailing
- Salesmanship
- Spanish
- Advertising
- French
- High School
- Illustration
- Postal Civil Service
- Retail Bus. Management
- Secretarial
- Sign Lettering
- Stenography
- Traffic Management

Name _____

Age _____

Home Address _____

City _____

State _____

Working Hours _____

A. M. to _____

P. M. _____

Present Position _____

Employed by _____

Length of Service
in World War II _____

Enrollment under G.I. Bill approved for World War II Veterans. Special tuition rates to members of the Armed Forces.
Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

OWN a Nationally Advertised Business

Now, we are appointing dealers in U.S.A., Canada, Mexico and foreign countries . . . in territories still open. If you are capable, cooperative and willing to work to enjoy success, we'll establish you in **your own business** and arrange easy terms to help you get started. Gross profits up to \$15 and \$20 a day on each of your service men. No experience needed.

Clean Rugs and Upholstery

Duraclean Dealers' businesses are built upon the solid foundation of a national organization with 20 years of Proven Success. Duraclean Service was established to improve cleaning methods for rugs and upholstery . . . to eliminate harsh machine scrubbing . . . to prevent shrinkage from soaking. Instead of floating surface soil down into upholstery and rugs, this amazing process actually removes it!

Protects Against Moths

Here is another year-round service rendered right in the home, office, or business building — without removing furnishings. Duraproof protects carpets, upholstery, furs, clothing, piano felts and auto interiors from damage by moths or carpet beetles. To our knowledge, Duraproof is the only mothproof service backed by a National Money-Back 4-YEAR WARRANTY.

Voluntary and Repeat Orders

Customers are not merely satisfied—many are enthused with results and tell friends and neighbors. Duraclean is recommended by America's foremost furniture and department stores. Services are NATIONALLY ADVERTISED in Quality Magazines to help create still more demand for you and to explain the superior merits of YOUR modern processes and to develop confidence in your service.

No Overhead Expense

Shop is optional! At the start you may want to render service yourself from your own home, on a part time basis. It's easy to learn. Almost every building in your territory houses a potential customer needing one or both services. Even auto dealers buy your Duraclean Service to revive upholstery in used cars.

Two-Way Profit

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de-icer that hooks to the exhaust system of a car. Patented by its inventor, Paul T. Giguere of West Roxbury, Mass., the device literally gives a "hot foot" to ice, melting it down to the pavement in minutes. Whenever he finds himself stuck on ice or snow, Giguere hooks the funnel-shaped de-icer to the tail pipe of his car, starts the engine and lets the heat melt away his troubles. A series of baffles inside the nozzle forces the hot gases to pass over the ice several times on their way out. The whole thing comes apart to fit in the car trunk.

Letter to the Editor

Gentlemen:

In the September 1950 issue of *Popular Mechanics Magazine* the article by John Ratcliff discussing the free-piston engine attracted my immediate interest. What I read, I understood.

However, there remained two points which were not discussed, namely the mechanism for fuel injection (including timing) and also the method of starting the engine . . . I would like to know how the above functions are accomplished . . .

Norman Ehlers,
R.R. 1,
Ludlow Falls, Ohio.

The engine has a regular diesel-type fuel injector. There is no timing device, since the pistons are self-governed, depending on the rate and amount of fuel injected. There is, however, a pair of rods working off a cam, which keep both pistons working in opposition, so that they do not fly back and forth regardless of each other. The engine is started with compressed air from a tank activated by the starter. On the larger engines there is an auxiliary compressor.

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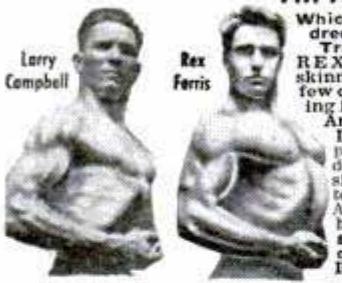
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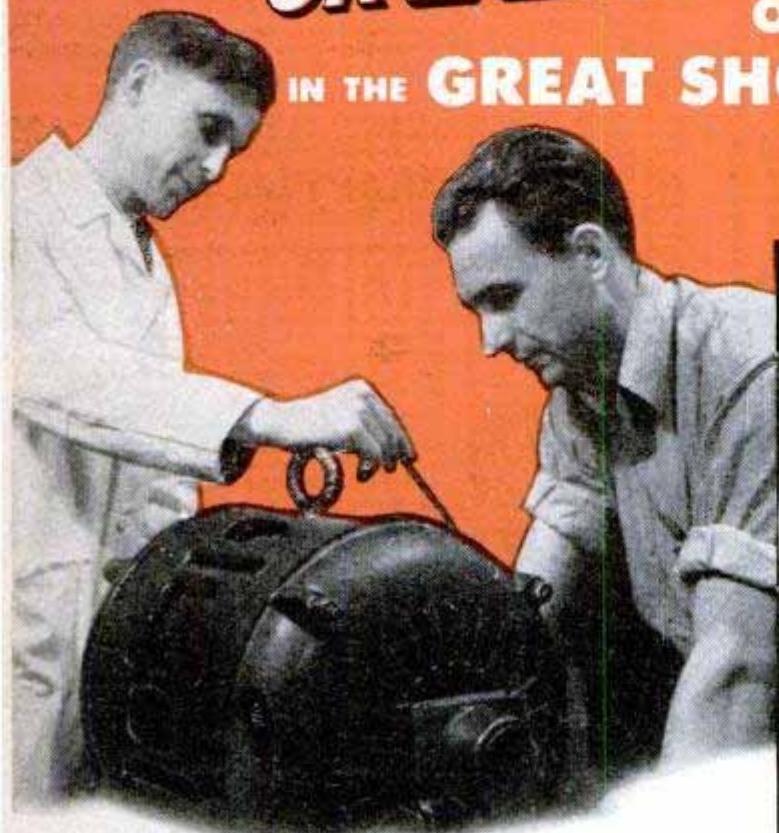
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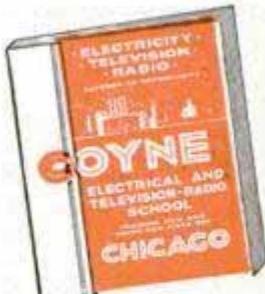
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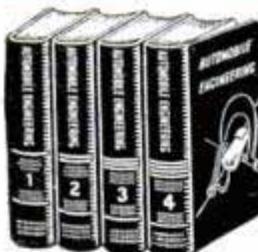
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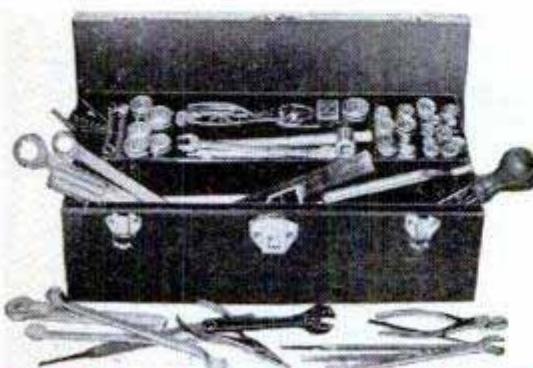
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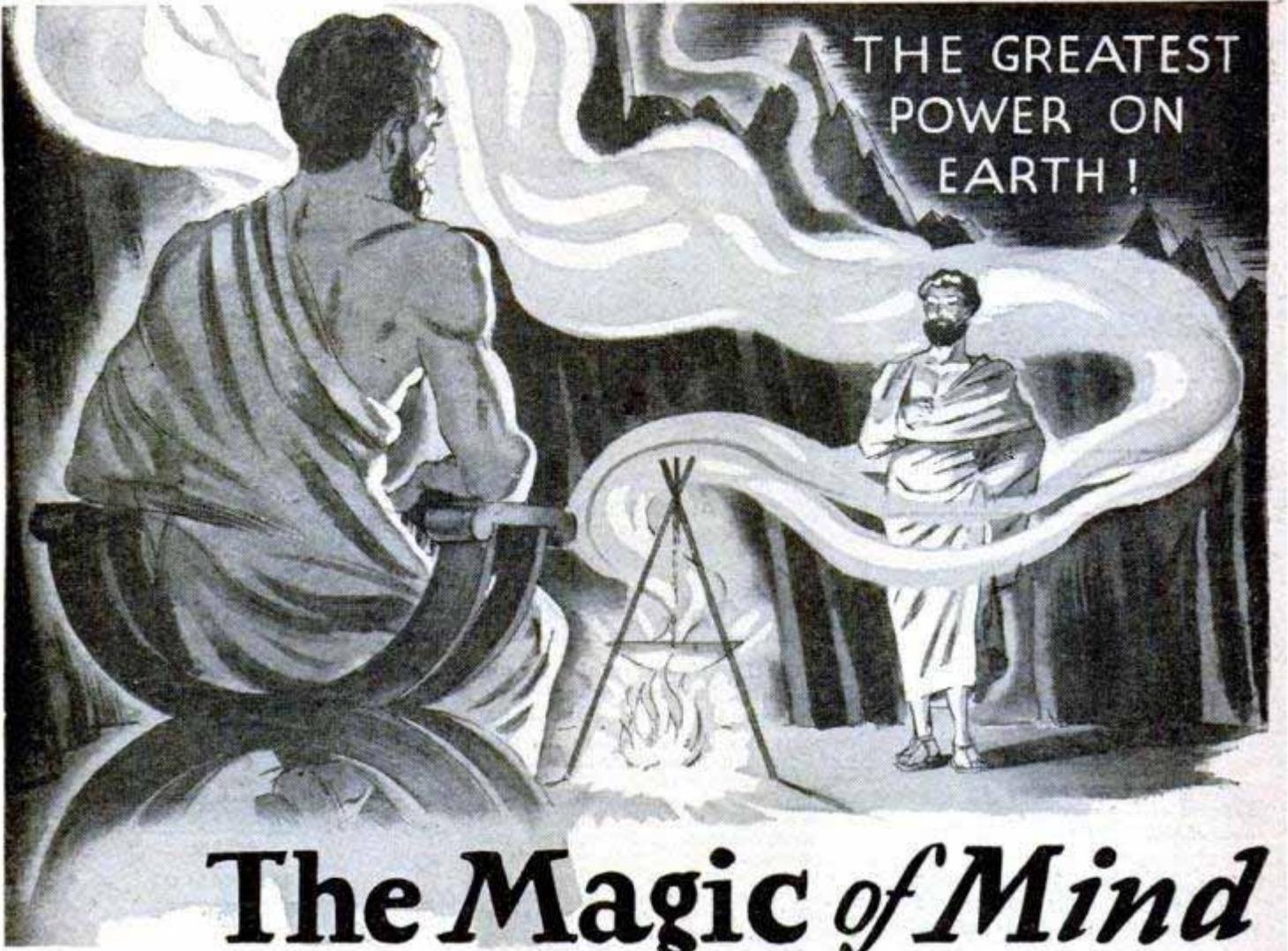
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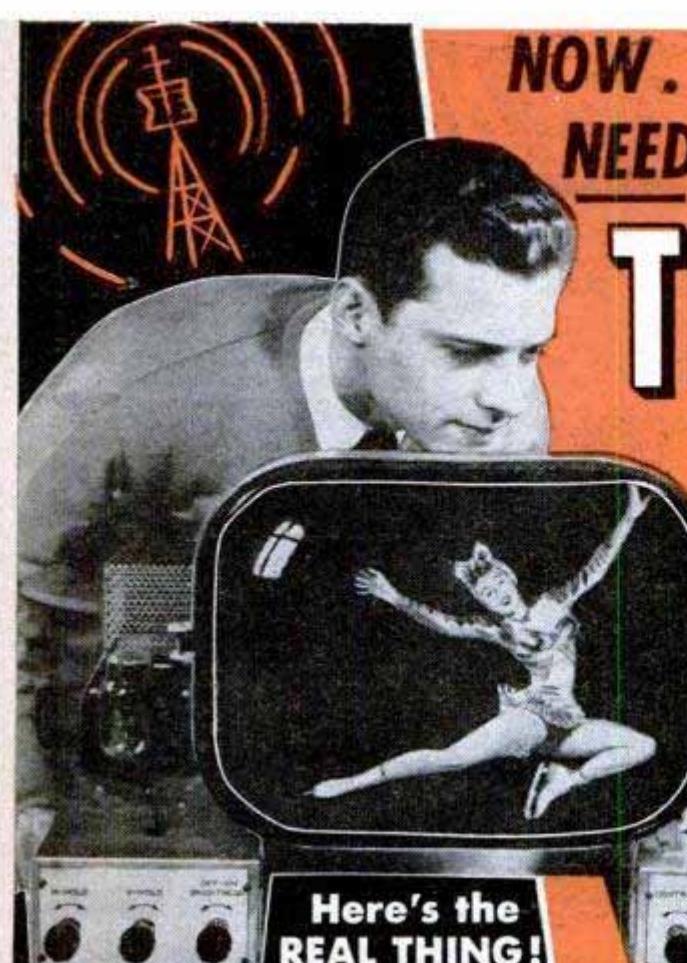
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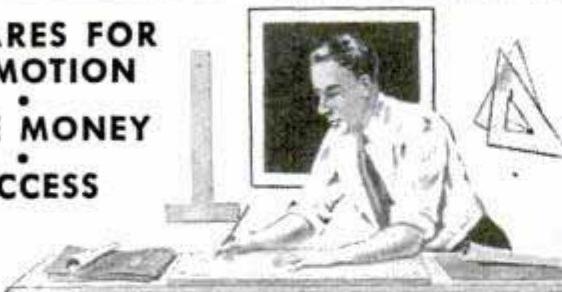
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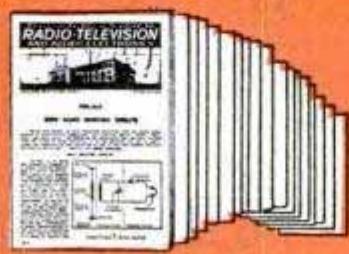
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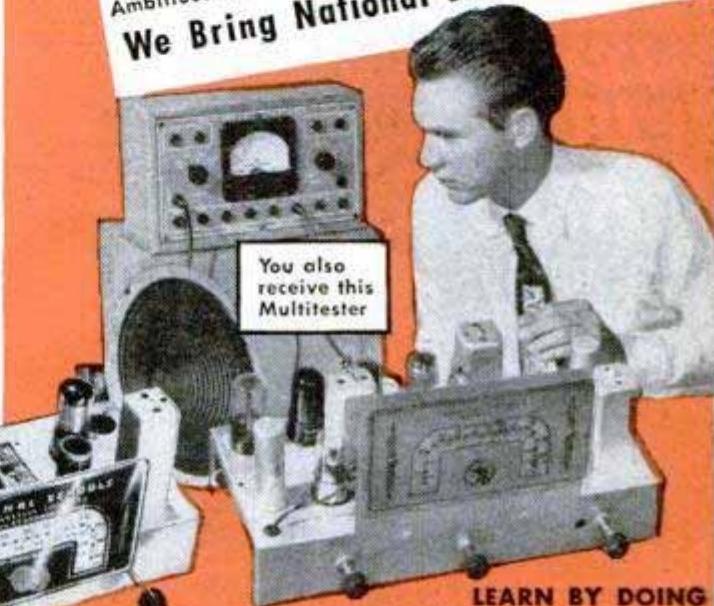


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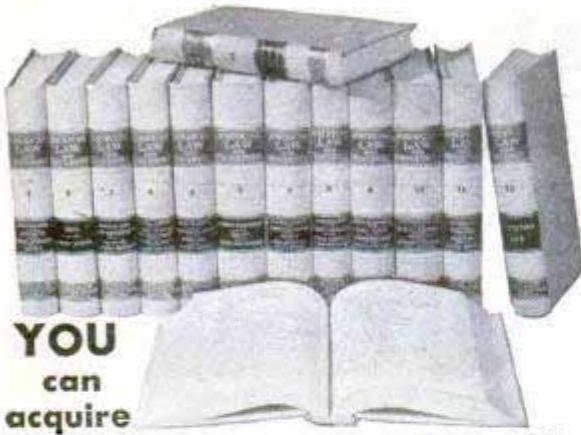
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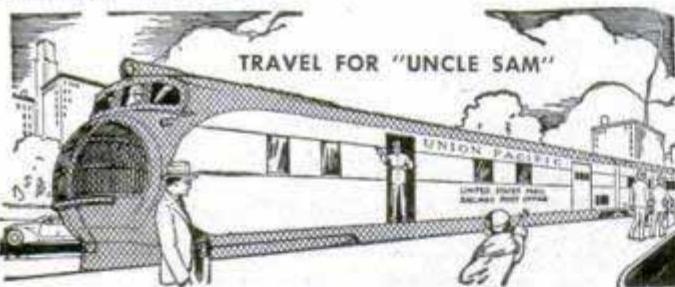
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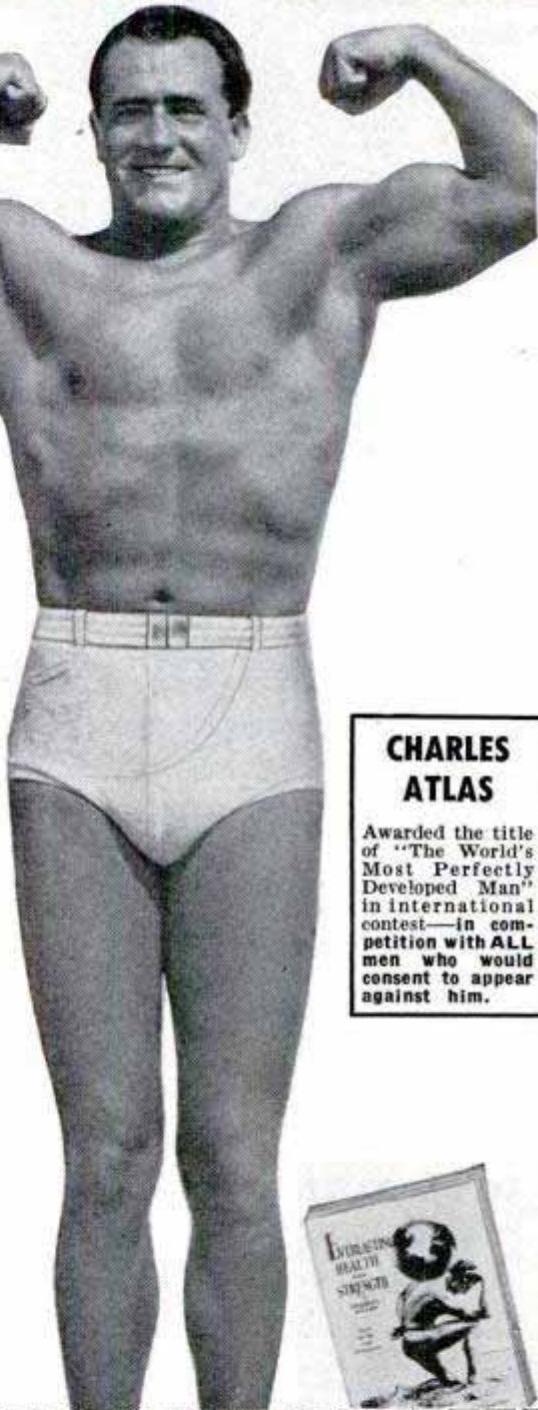
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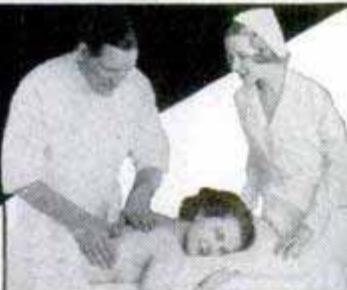
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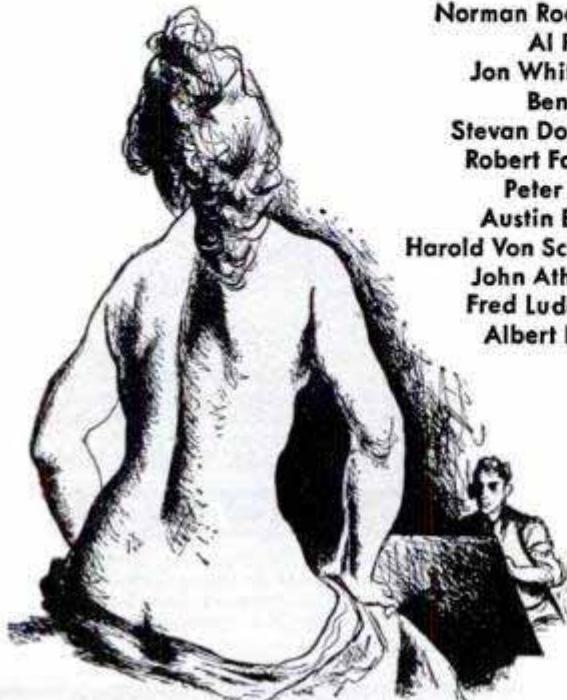


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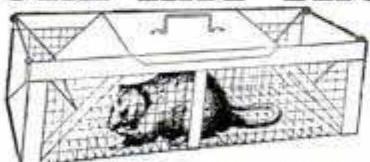
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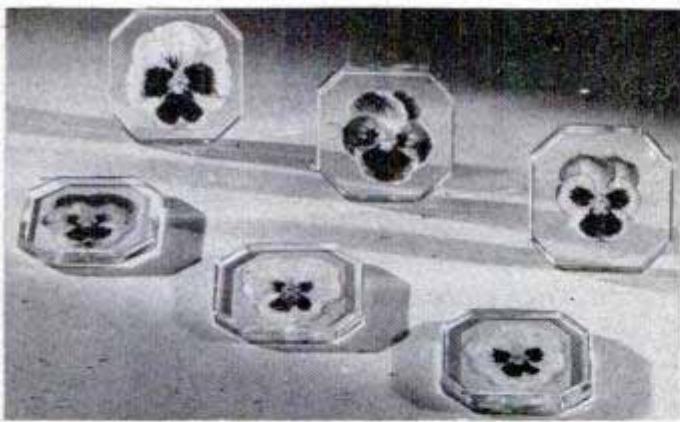
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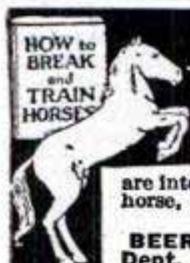
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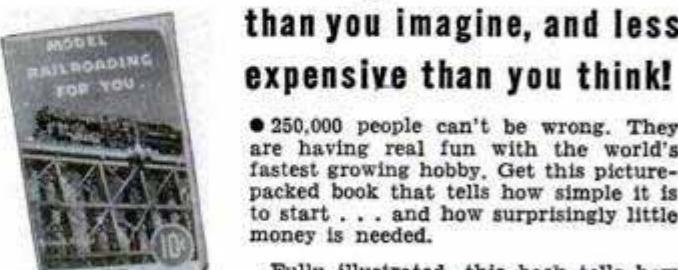
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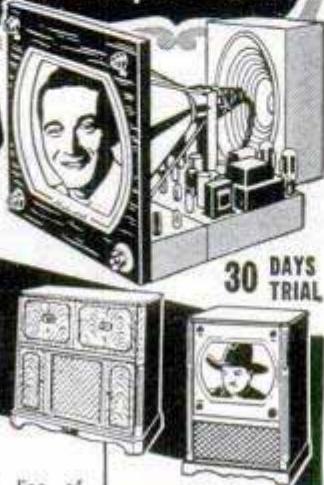
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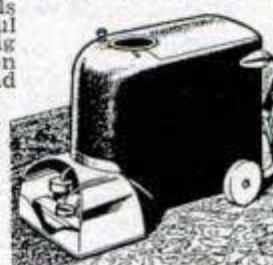
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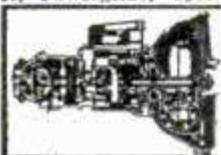
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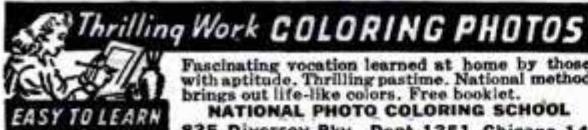
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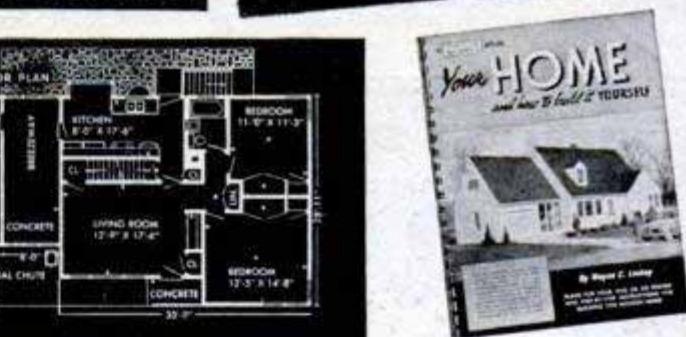
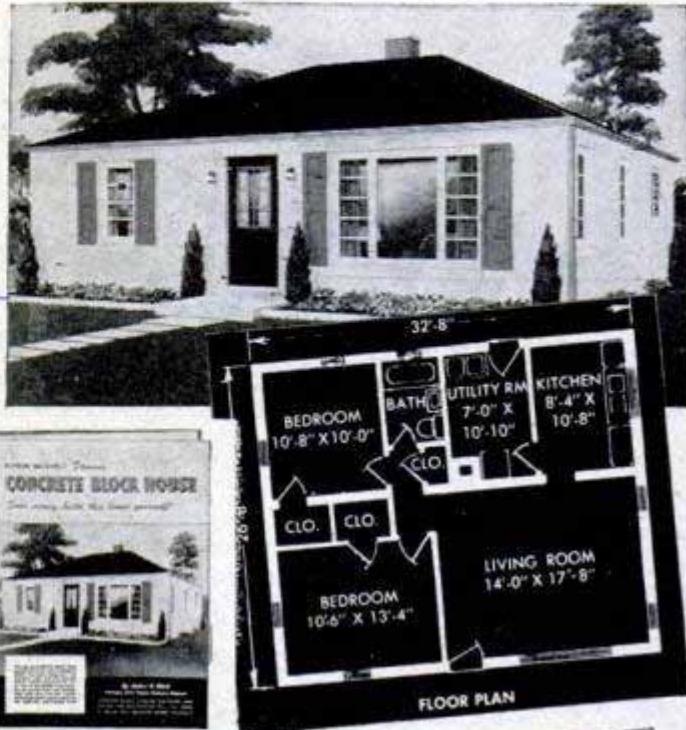
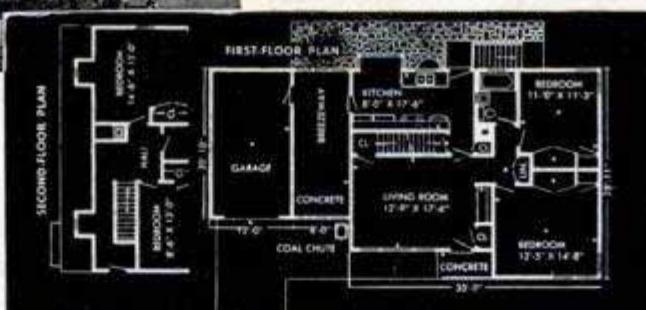
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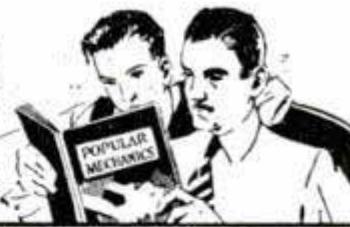
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START Home mailorder business. Details. Gedgard, Box 798-V, New York 1, N. Y.

MAKE Perfumes at home. Write, "Carey Laboratories," 1914 Chouteau PM-1, St. Louis 3, Missouri.

LIQUID Rubber. Make flexible molds. Free sample. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

HOW To set up and run a mirror shop! Resilvering mirrors. Making chipped glass nameplates. Electroplating. Salts and rectifiers. John Sprinkle, V60, Marion, Ind.

BUY Wholesale—Million articles. Supply source directory, dime. Nelko, Box 3462-DA, Chicago 54, Ill.

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EARN Big money at home, easy work, no investment, exciting details free. Harrison, 954-c Empire, Benton Harbor, Mich.

HUNDREDS Of mail, local opportunities. Clinton Sales, 88 Weaver Ave., Buffalo 6, N. Y.

MAKE Money with ultra cleaning paste. Quickly removes oil, grease, dirt from fabrics, gloves, etc. Big profit. Easily made. No machinery. Guaranteed formula \$1.00. Ultra, 3519 Troost, Kansas City, Missouri.

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LEARN Screen process printing. Big profits. Particulars free. Joseph Bolger, 148 Concord, River Edge, N. J.

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SPECIAL Rubber for making molds. Literature and sample free. Universal, Box 1076-A, Peoria, Ill.

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A Factory in your home, garage! Mechanics' waterless hand cleaner, glass cleaner, auto cleaner-polish; many others. All formulas free, but if you also want free samples send 15c postage. Western Aircraft, Dept. B, Los Angeles 6.

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COMMERCIAL Deep frying course. Mock chicken legs, potatoes. New and proven methods. Learn about this money-making field. \$2.50 p.p. Concession, Toledo 13, Ohio.

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NEW Liquid plastic. Clear, colors. Cast without heat. Embed flowers, insects, coins. Saw, drill, carve. Free folder. "Liquid Magic," shows fine things you can make and sell. Write today. Castolite, Dept. A-101, Woodstock, Illinois.

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CHEAP Automobile polish. Information 10c. Write James Lamont, Beacon, New York.

PROFITABLE Formulas. Each set \$1. Auto waxes, white tire cleaner, casting marbles, hand cleaners, polishes. Plastics, Box 1574, Boston 4, Mass.

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FORMULAS. Trade secrets, for nearly everything. Catalog free. Creative Publishers, Winnetka 6, Illinois.

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\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

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WIN Real cash. Even beginners make handsome profits selling new 21 for \$1.00, 3-dimension everyday greeting card assortments. Novelties, gift wraps, household items. Free samples imprinted stationery, napkins, notes. Deluxe all-occasion samples on approval. Bonus. Special offers. Write Pilgrim Greetings, 111 Summer, Dept. AN-6, Boston, Mass.

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MAKE Perfume. Big profits. Mailorder. Expect secrets. Write Imsco, 6347 Parnell MA-1, Chicago 21, Illinois.

OUR Agents make big money selling all-occasion greeting cards. Terrific box of 21 only \$1.00. Over 75 other boxes. Profits to 100% plus bonus. Free samples. Kit on approval. Regal Greetings, Hazel Park 26, Michigan.

FREE Water and our concentrates make flavors, lotions, shampoos, perfumes, cleaners, polishes. 125 products, free catalog. Qualco, E-20030 Russell, Detroit 3.

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GREETING Card moneymakers. Birthday, Valentine, Easter. Catalog free. Greenport Art Company, Brooklyn 15, New York.

NEW "Sponge" wall cleaner. Erases dirt like magic. Wallpaper, painted walls, ceilings. Saves redecorating. Lightning seller. Samples sent on trial. Kristee 121, Akron, Ohio.

BRAND NEW! Amazingly different and smart everyday cards, 21 for \$1. Magic window designs. Take easy orders. Make up to 100% cash profit. Big line \$1 assortments, personal stationery, imprinted matches. Free imprint samples. Assortments on approval. North Star, 31 Glenwood, Dept. P-18, Minneapolis, Minn.

GREETING Card salespeople. \$50 without risk. Sell America's leading 21 card everyday boxes. Samples on approval. Amazing newest gift items. Free samples 150 for \$1.00 personalized stationery. Write today. Lorain Art Studios, Dept. J-44, Vermilion, Ohio.

IS \$210 A week worth a penny postcard to you? Then rush card with name and address for special free trial plan that sells amazing new automatic refrigerator defroster "like hot cakes!" Write to Mr. Lewis, D-Frost-O-Matic Corp., Dept. PMC-1, 6 N. Michigan, Chicago 2, Ill.

NO Experience needed to make money fast for yourself or organization. Sell gorgeous new all-occasion assortments, 21 cards \$1.00. Valentines, Easter cards, religious, novelties, unusual gifts. Scented stationery, notes, wrappings. Over 100 items. "Get Started" plan. Write for samples on approval. Hedenkamp, 361 Broadway, Dept. PM-10, New York.

FOG-STOP Windshield cloth. Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. Kristee 122, Akron, Ohio.

WOMEN Who can sew and alter dresses, make extra money part time taking orders for big manufacturer. All sizes. Amazing values. Everything furnished. Harford Frocks, Dept. D-235, Cincinnati 25, Ohio.

SELL Nationally advertised adding machines for \$12.95! You can make \$25, \$35, even \$50 a day! You can clear 45% on these desk model, precision built, portable adding machines at only \$12.95. They're fully guaranteed and amazingly easy to sell. For life-size color photo and complete details, write today to Lightning Adding Machine Co., Inc., Dept. P2, 1260 West Second St., Los Angeles 26, California.

JUST OUT! New thrilling sensation in everyday cards. Rich foils, satins, velours sell on sight, 21 for \$1. Make up to 100% profit, 50 assortments, imprint stationery and book matches, gift items. Two \$1 assortments on approval, imprints free! Joy Greetings, 507 N. Cardinal, Dept. 140-A, St. Louis, Mo.

BUY Thousands of nationally advertised products direct from manufacturers and distributors. Write for "Buy Direct and Save," Service Publishing, 1420-A Investment Bldg., Pittsburgh 22, Penna.

SELL Duffy's metal and porcelain wonder polish. Good repeater. Excellent profits. Duffy, 1233 No. Jackson, Milwaukee 2, Wisconsin.

FREE Samples. Big profits showing amazing "Glow-in-the-dark" specialties. House numbers, pictures, plastic novelties, ashtrays, keyholders, religious and nursery objects, etc. Madison Plastics, 303 Fourth Ave., New York 10, N. Y.

NYLON Uniforms. Immediate delivery, immediate profits. Sell to doctors, dentists, nurses, waitresses, beauticians, housewives. Free sales kit. Superior Fabrics, Dept. P-1, 3936 Market, Philadelphia 4, Penna.

NYLONS Direct from mill. Sample free. Guaranteed against runs. No experience or money needed. Also nylon slips, briefs. Earn big money spare or full time. Become manager, appoint agents. We pay you 40¢ for every \$1 your agents earn. Sell men, women necessities needed all year 'round. Ergim Co., 992 Columbus Ave., New York.

TO \$35.00 Weekly. Spare time, home operated mail order business. Successful small "beginner's" plan. Everything supplied. Lynn, 5710-M Bankfield, Culver City, California.

BE A money maker. Use your home as magazine headquarters. Liberal commissions. No experience—No capital needed. Everything furnished. Write for free catalog. McGregor Magazine Agency, Dept. 500A, Mount Morris, Ill.

TREMENDOUS Profits selling Sunshine cards, America's most distinctive greeting card line. Amazing values, 21 everyday cards with lined envelopes, bonnie notes, clever comics assortment, gift wraps, stationery, napkins, plus many more top items. Act now! Write for sample kit on approval. Sunshine Art Studios, Dept. PM-1, 115 Fulton Street, New York 8, New York.

TAKE Large unit orders with wool and cotton uniforms, initial buckles, belts, badges. Choice 3,000 emblems. Prospects everywhere. Write Hook-Fast, Box 480-PM, Roanoke, Va.

SELL Du Pont nylon uniforms. Complete line famous exclusive Hoover styled nylon uniforms for beauty shops, nurses, doctors, waitresses, others. Best quality, splendid values. Exceptional income. Real future. Equipment free. Write fully, Hooper, Dept. K-100, New York 11, N. Y.

ABSOLUTELY Free! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 7003, Cincinnati 3, Ohio.

MAKE Money calling on friends! Show nationally advertised greeting card assortments—new all-occasion assortment and laugh-packed barrel-of-fun assortment. Sells for \$1.00—up to 50¢ profit for you! Also personal notes, gift wrappings, stationery, gift items, others! Get two assortments on approval. Write Wallace Brown, 225 Fifth Ave., Dept. R-4, New York 10.

FREE Sample nylon stocking of world's only nationally advertised hosiery line actually guaranteed against runs, snags or excessive wear, regardless of cause! It's amazing but true. Every weight from sheerest 15 denier to heavy 70 denier—all gauges to luxury 60 gauge. Amazingly low prices, starting at \$1.08 prepaid for sheerest 15 denier 51 gauge. Not sold in stores. Good Housekeeping guarantee seal. Also complete line men's hosiery guaranteed one full year or replaced free. Full variety lingerie in crepe, satin and nylon, featuring all nylon slip at \$2.95, satin slip at \$1.55, etc. Housecoats and robes. Kendex sales people will earn one million dollars this year. Get your share. No money or experience needed. Pay nothing now or later. Just show free outfits. Write orders. We deliver and collect. Advance cash plus huge bonus. Earn money spare or full time. Become manager; appoint others to sell for you; earn steady income on their sales. Man or woman—young or old, you can earn more money than you ever thought possible. Everything you need is furnished free and prepaid, including nylon stocking, samples of materials, sales books, 36-page salesmanual, color cards, etc. Simply write your name and address on postcard and mail to Kendex Corporation, Babylon 13, N. Y.

MAKE Money with Merritt. Sell Davis air cushioned shoes, dress, work, heavy duty. Popular priced. Advance commissions. Cash bonuses. Experience unnecessary. Send to Geo. Merritt Shoe Co., 51, Brockton, Mass.

UP To \$50.00 in a week and tailored suit for yourself without paying one cent. Write for plan. J. C. Field & Son, Dept. N-1716, Harrison and Throop Sts., Chicago 7, Ill.

SELL New automatic floor waxer. Trigger on handle. Hands never touch floors or wax. Retails \$2.95. Profit 125%. Write Smith, Inc., Greenfield 14, Mass.

LADIES' Garters, handkerchiefs. Free swatches. Holiday, 8506 96 St., Woodhaven, N. Y.

I'LL Put a "shoe store business" in your pocket! Nation's leader trains you to make big money! Fit men, women. Free sample outfit. Write today! Consolidated Shoe System, Dept. S-99, Chippewa Falls, Wis.

SELL Ultra-blue stock signs to stores. 1000 slogans, comedy, general, religious. "7x11" cost 6c, sells 35c. Make money. 15 samples \$1.00 postpaid. Lowy, 812 Broadway, Dept. 601, New York City 3.

EXTRA Cash, easy! Sell friends newest design 21 for \$1.00, dark card, novelty all-occasion greeting card assortments, gift wraps, animated books. Profits to 50¢ per \$1.00 box. Special offers. Bonus. Prompt service. Experience unnecessary. Write today for free samples name imprinted scented stationery, napkins, book matches, feature assortments on approval, free catalog, selling plans. Elmira Greeting Card Co., 2109, Elmira, New York.

WIN Suits and earn money! Both easy with amazing plan. Show finest made-to-measure tailoring to friends, neighbors. No experience or investment. Free outfit. Write Progress Tailoring, Dept. N-217, Congress & Throop, Chicago 7, Ill.

FAST Profits—No investment. Send for big, free catalog. Plastic aprons, tablecloths, etc. 150 sure-fire items. We guarantee sales. Write The Halliday Company, Dept. M, 15-19 Pennington Ave., Passaic, N. J.

DO You need money? \$40.00 is yours for selling only 50 boxes of our 200 greeting card line. And this can be done in a single day. Free samples. Other leading boxes on approval. Many surprise items. Experience unnecessary. Free samples personalized stationery, napkins. Write today. It costs nothing to try. Cheerful Card Co., 63, White Plains, N. Y.

AGENTS—It's new, sensational, 10-second demonstration. Take orders for deluxe "In-A-Purse" shopping bag. Every woman wants. Priced right, makes ideal gift. Sample furnished. Forst Sales, 3959-A Ogden, Chicago.

AMAZING New way to earn money quickly and easily with gifts, stationery, cards. No experience necessary. Send for free home demonstrator and all else needed. 2 best sellers on approval. Terry Studios, 500, Westfield, Mass.

200% PROFIT. Bulk or packaged rat killer. Kilsem, Crystal Beach, Fla.

FACTORY Representatives. Power mowers. Gas-electric. Appoint dealers. State territory. Rotacut, RC-2011, Excelsior Springs, Mo.

INDIAN Tom-Toms. Metal bodies, skin heads, hand made, hand painted. Wholesale only. Indian Arcraft, 1649 N.W. 42nd St., Miami 42, Fla.

EARN Big profits! Every home needs new Tapaline Multiplugs that makes 8 appliances available from one outlet. Sample \$1.50. 16-page catalog of household items free. Sunshine Sales, Dept. WP-7, Loudonville, Ohio.

WANTED—Purchasing agents. No money or experience required. Write Dept. C, Purchasing Manager, 2719 Lawrence, Chicago, Ill.

FREE Complete sales kit. Sell personal initialed belts and buckles, cap badges, tie holders, etc. Choice of 2000 emblems. Write for free selling outfit today. Hook-Fast, Box 1425PM, Providence, Rhode Island.

\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

SCHOOL Seniors! A postal will bring you our wonder, Kwick-Sell Cardatalog of popular graduation name cards. Biggest profits! Only firm giving free Golden Memory Book and Souvenir Chest. Don't miss out. Hurry that postal! Craftcards, Box 235 (L), Pittsburgh 30, Penna.

PHOTO-Salesmen, agents. Sell beautiful hand colored plastic enlargements and sensational new photo compacts, rings, bracelets, lockets, etc. Collect deposit, we deliver. Profitable sideline. Send card, for free sample kit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.

MAGIC Cleaner—Laundry soap deal. Hotter than a firecracker. Big profits. Sample free. Bestco, 4642 No. Central, Chicago.

SCHOOL Seniors—Earn sensational profits selling classmates America's most beautiful graduation name cards. Largest selection. Out sells all others. Free sample kit. Printcraft, Dept. M, 1425 E. Elm St., Scranton 5, Penna.

DRESSES, 18c; Coats \$1.00, blouses 35c. Free catalog. Crown, 164-P Monroe Street, New York.

WRITE for free booklet and catalog telling how to earn substantial profits in your spare time by forwarding new and renewal subscriptions to all magazines for your friends and neighbors. Oldest U.S. agency. Established 1869. Moore-Cottrell, North Cohocton, New York.

SELL Balloons! Combs! Novelties! Excellent sideline. Carleton House, Texas City, Texas.

JEWELRY Factory desires salesmen, distributors, jobbers. Pickcraft, 19 Bank Street, Attleboro, Mass.

SELL Big money-maker to men and women. Easy handwork makes fast-selling useful articles. Sunmade Company, Brockton 64, Mass.

GOLD Lacquered window sign letters. Large sizes penny each. New foils. Absolutely beautiful. Free samples. Atlas, 544 W. 79th, Chicago 20.

AGENTS: Stamping names on key protectors. Sample 25c. Stamping outfits, checks, social security and name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N.Y.

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WHERE To buy 800,000 articles direct from manufacturers. Including hundreds of scarce items. Sent free. "Your Profits Under the Spotlight." Glass Publishing Co., Ellwood City, Penna.

AGENTS—300% Profit selling genuine gold window letters: stores and offices. Free samples. Metallic Letter Co., 438-B North Clark, Chicago.

EXCELLENT Sideline for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also, make money with our line of automobile initials and sign letters. Free samples. "Ralco" XL-Roxbury, Boston 19, Mass.

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ADVERTISING Calendars, plastic, leather items, pencils. We need reliable representatives. Full or spare time. Commission advanced, bonus. Dep's Sign Service, Albion, New York.

SELL Our waterproofings, floor mastic, cement hardener, etc. (30 items) to maintenance men, building owners, contractors. Can start part time. Commission. Territory. Write Haynes Products Co., Desk 6, Omaha 3, Nebr.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. M-151, 7530 Greenwood, Chicago.

EARN Big money fast! Sell finest-quality advertising work uniforms to garages, factories, filling stations, etc. Free selling kit. Topps, Dept. 531, Rochester, Ind.

SALESMEN: Sell our memo machine. Forty percent discount. Smith Brothers, 222 S. Ardmore Ave., Villa Park, Illinois.

TURN To page 234 and read the Snap-on Tools Corporation advertisement. "How hard would you work to earn \$5,000 to \$10,000 a year in a business of your own?" Study the requirements and if you qualify, write the Sales Manager immediately.

AD MATCHES: Sell amazing designs—20, 30, 40 and 240-light book matches. Big spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-13, Chicago 32, Illinois.

RICH Opportunity for men in their 50's. Healthful, pleasant occupation. No investment needed. 150 of our men made \$500 to \$3,000 in one month; many just beginners. Heckman made \$104 first 2 hours. Crowley made \$224 first day; exceptional earnings. Openings available. Write President, Box 711, Dept. PM, Fort Worth 1, Texas. (If you live in Canada write: President, 25 Industrial St., Dept. PM, Leaside [Toronto], Ontario.)

AMAZING Discovery, Master Glaze, puts brilliant glass-like surface on cars. Free sample, information. Big commissions. Master Glaze, Dept. 702, 7720 Harwood, Milwaukee, Wisc.

EXTERIOR Fluorescent Post-Lites sweeping country. Terrific demand by city stores and highway businesses to increase sales. Big orders. Big profits. No investment. Nationally advertised in Saturday Evening Post and Time Magazine. Address: Long, 108 West Illinois, Chicago 10.

WANT To make real money? You can positively make \$50.00 a day and up selling a brand new item going to every type of food and beverage store, factories, laboratories, hospitals, etc. First time advertised. Write for free details today. Johnson-Hartman, 53 West Jackson Blvd., Dept. PM-1, Chicago, Illinois.

\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

NEW Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 28 E. Jackson, Dept. 17, Chicago 4, Ill.

BIG Money taking orders. Shirts, ties, socks, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-AN Lincoln, Chicago.

NEW! Fraction of an inch adding machine in disc form, aluminum, etched. Add and subtract fast, accurate. For the engineering office and machine shop. Price \$3.50. Perfect sideline for any tool salesman. Pamphlet on request. K. Jaeger, 48 N. W. 48 Street, Miami 37, Fla.

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LETTER patterns produce professional signs, catalogue dime, refundable. Tracing folios, 12 alphabets, ten numerals \$1.10, three different \$3.00. Demonstrators, 639-P Paulina, Chicago 12.

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SIGN Painting taught at home. Test lesson free. Ben Kerns, Box 812-T, Greenville, S. C.

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RUBBER Stamps, office supplies. Catalog 10c (refundable). Williams, Box 648, Plainfield, N. J.

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READY Made stamps, free list. Criterion, Box 2326, Denver 27, Colo.

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100 LETTERHEADS, 100 Envelopes, stamped in beautiful gold or black. Limit three lines. 8½" x 11". \$3.95, postpaid. Check or money order. No c.o.d.'s. Shorr's, 24 North Munn Avenue, East Orange, New Jersey.

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SEND 10c Now for our 48 page 1951 price list—refunded first order. McCall Press, 1326 South 27th, Omaha, Nebraska.

1000 BUSINESS Cards \$2.50 prepaid. Samples free. Reliable Print Shop, 905 East Jefferson, Louisville 6, Ky.

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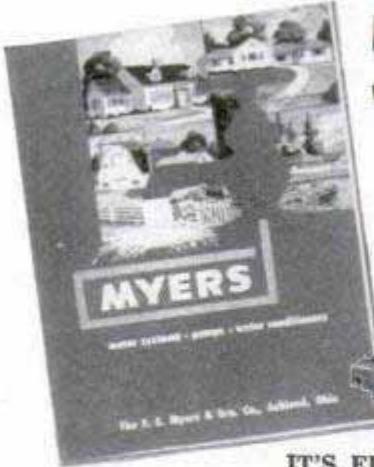
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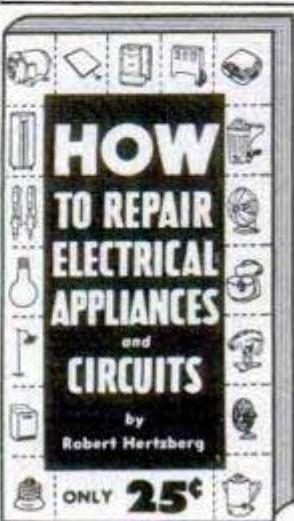
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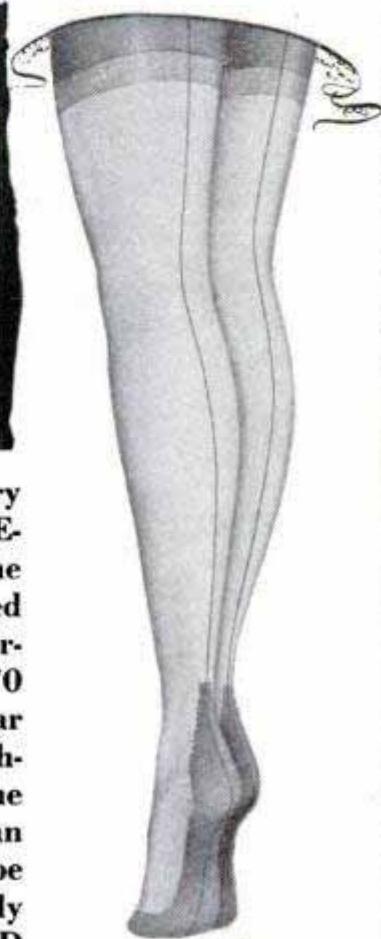
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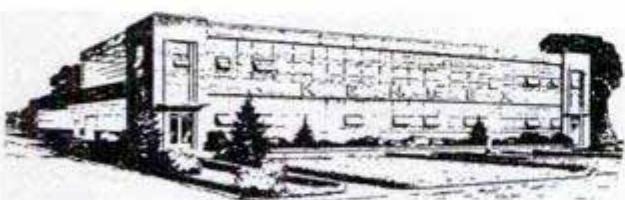


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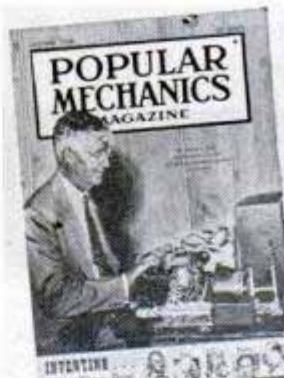
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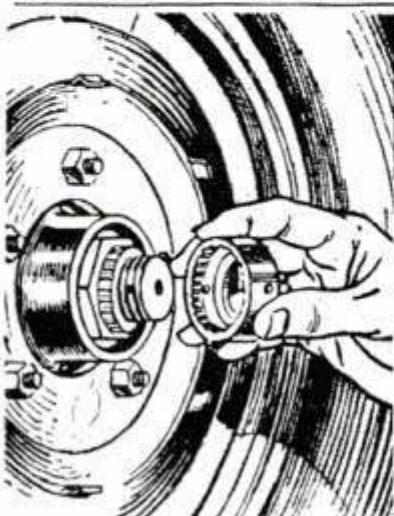
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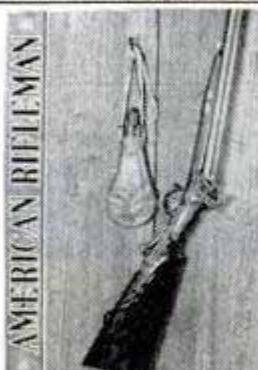
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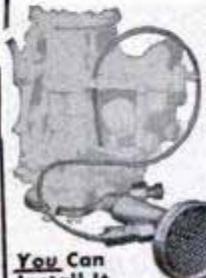
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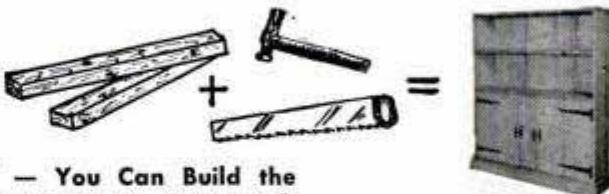
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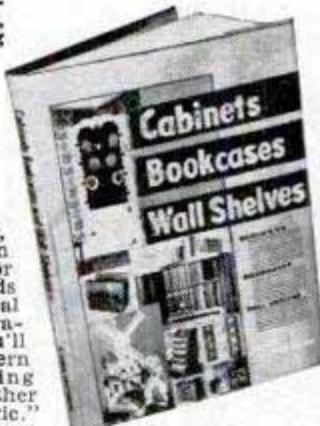
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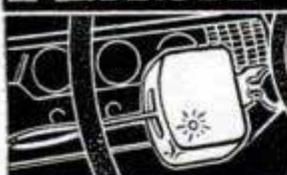
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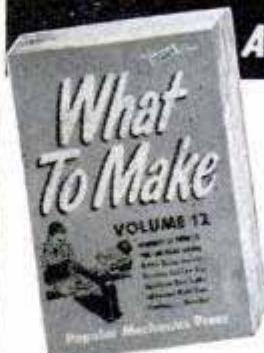
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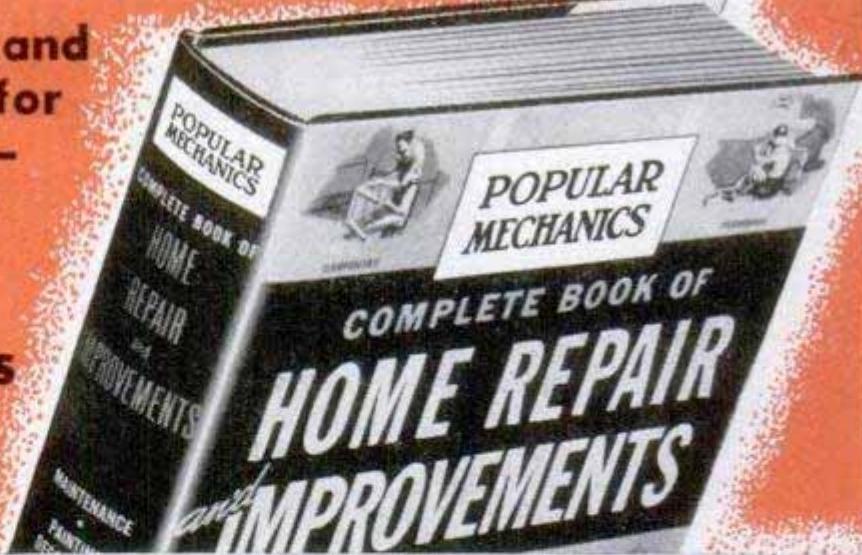
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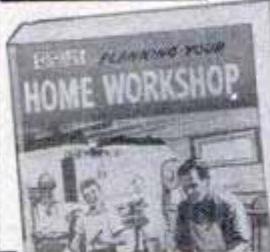
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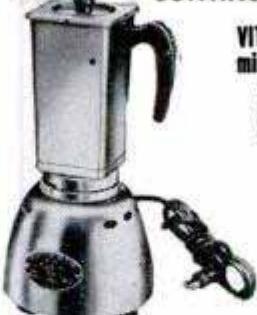
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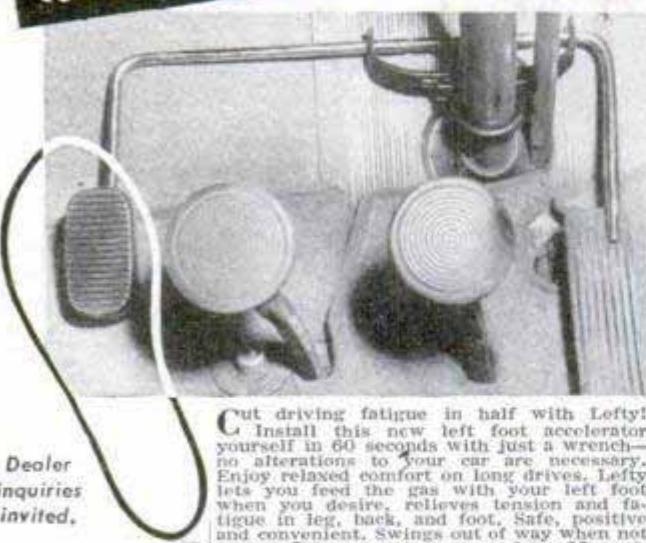
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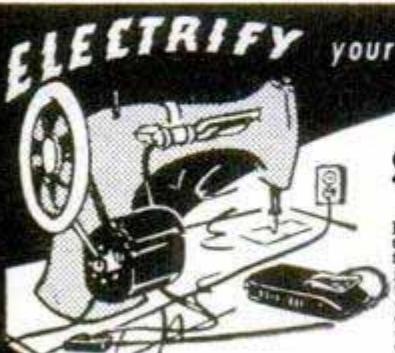
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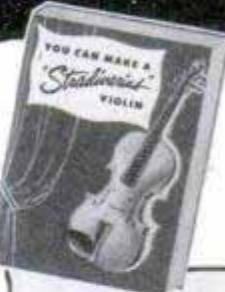
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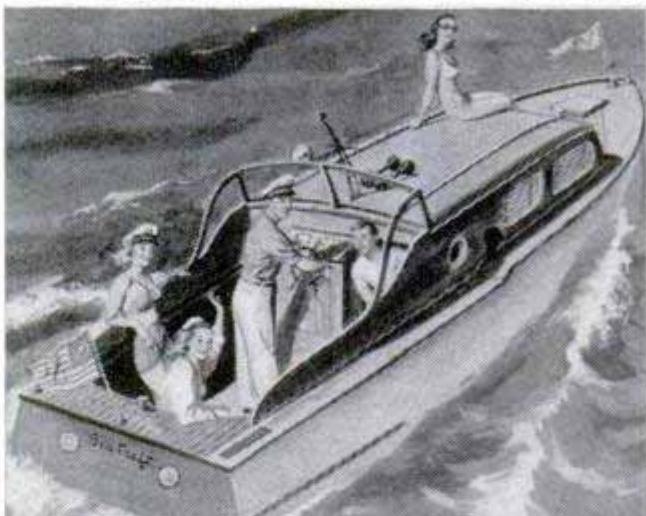
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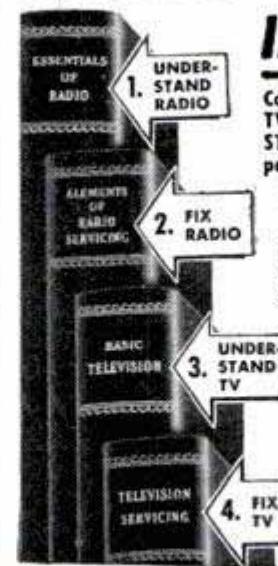
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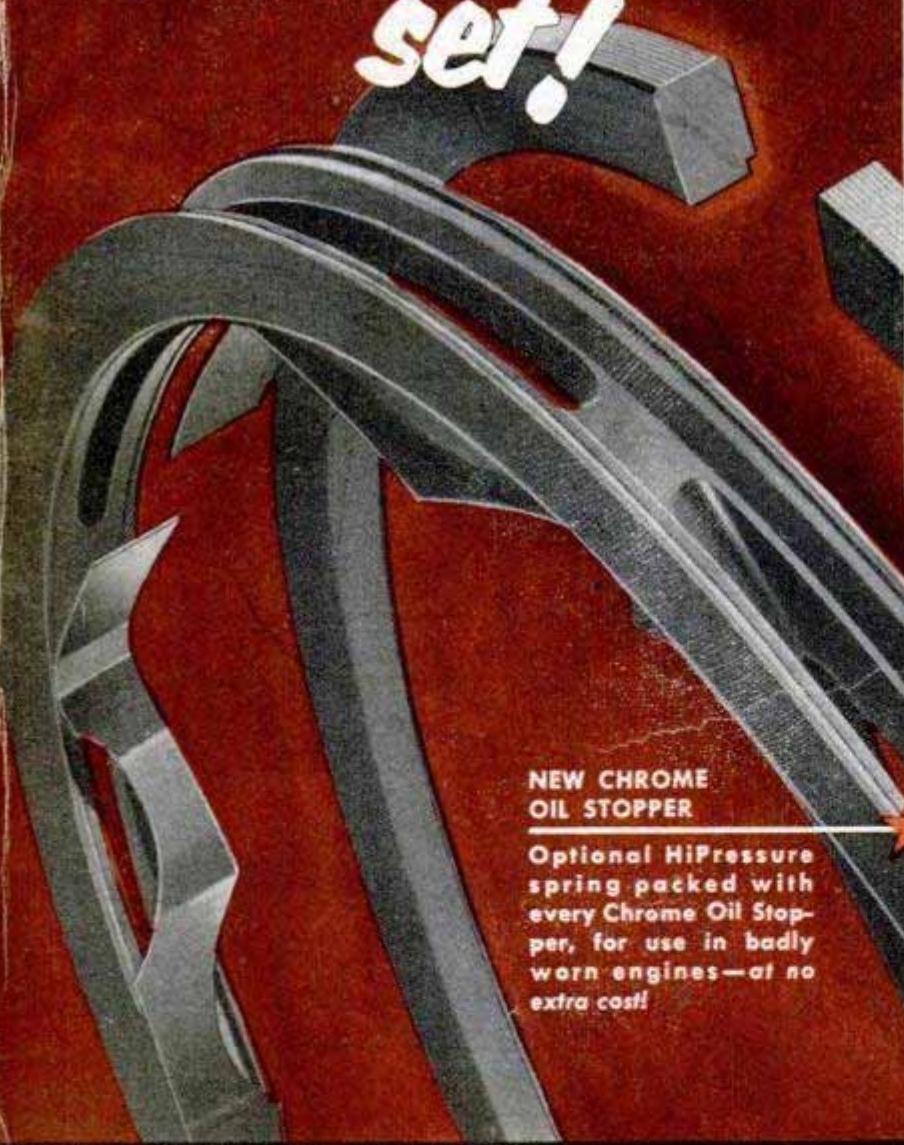
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NEW TREES FROM OLD

By Thomas E. Stimson, Jr.

A QUICK WAY to grow a tree is to chop a short branch off an existing tree, soak the branch in a hormone solution and plant it.

A year later you'll have a flourishing sapling and within three years your tree should be as large as a five or six-year-old.

The process isn't quite that simple but that's the general idea.

Propagating trees and other woody plants from their cuttings got a boost about 12 years ago when it was found that virtually any cutting would produce roots of its own when stimulated by various synthetic hormones. Since then techniques have been standardized so that anyone can raise trees or plants by the new method.

If there's a tree in your neighborhood that you admire, you can grow one just like it, provided the owner will let you have a foot or two of branch. Or you can take a limb from an apple tree, cut the limb into one-foot lengths and raise a tree from each one of the segments. You'll have your own apple orchard.

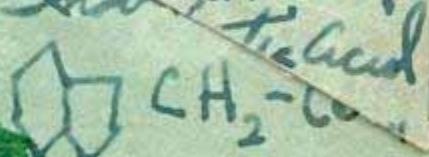
Several years ago Louis L. Joo of San Marcos, Calif., got an order for 100,000 olive cuttings per year from agricultural interests in Mexico. Each year, now, he makes the rounds of all the olive orchards in his vicinity and collects the pruned branches that are being thrown away. In some cases, he offers to prune the trees for nothing so that he can get the fresh cuttings. With a power saw he cuts the branches into one-foot lengths and delivers them to Mexico. There the ends of the sticks are soaked for a day in a dilute solution of indole acetic acid and are put away under moist sawdust

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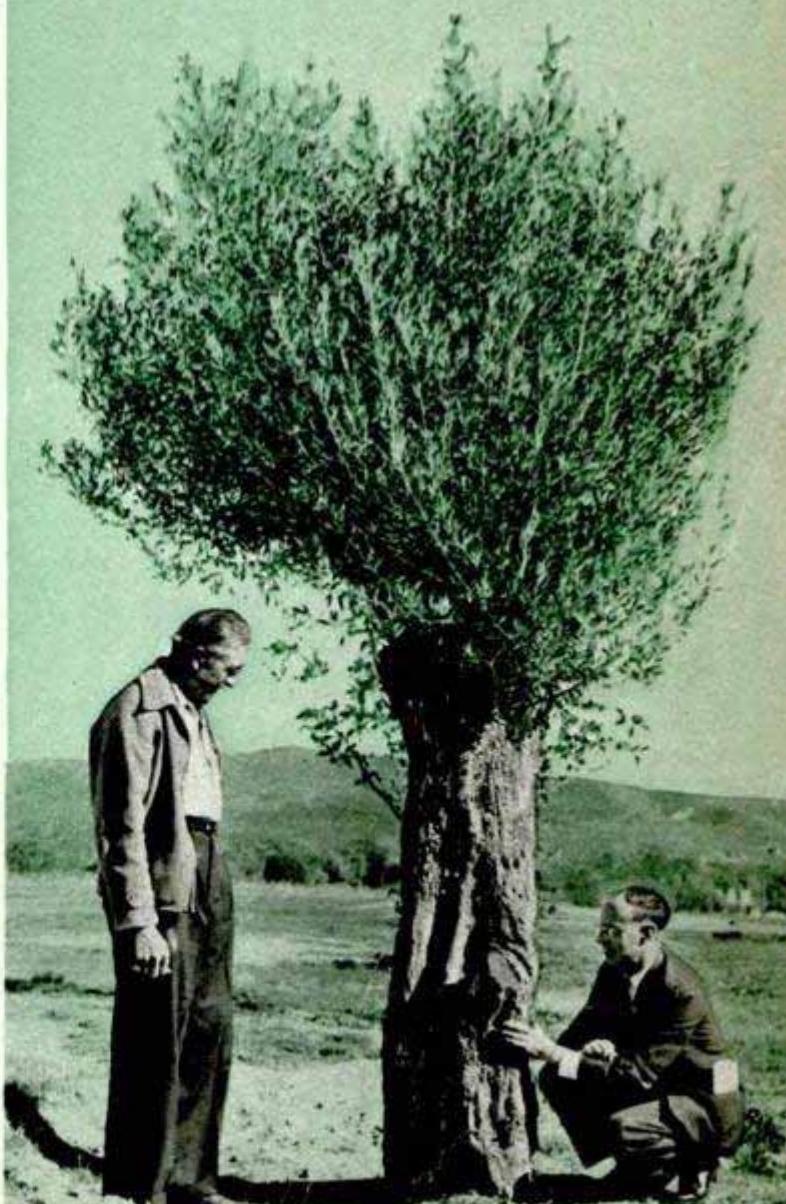
JANUARY
1951

WRITTEN SO YOU CAN
VOL 95

UNDERSTAND IT
NO. 1



The two-year-old olive tree below is an oddity in hormone experiments with hundreds of plants. An eight-foot section of trunk was treated with root hormones and then replanted and in just two years produced the healthy bushy top shown here





Specimen at left shows typical 90-day root formation. Right, similar cutting treated with hormones shows big growth

Right, injecting root hormones directly into ailing tree with hollow needle connected by tube to a pressure tank

for a month. By then each stick is sprouting a set of its own roots. Next, the sticks are soaked in a solution containing B-1 and other plant vitamins and they are then set out in a nursery.

A few weeks later the planted sticks begin to put out leaves and within a few months, after receiving more vitamins by irrigation, they are sending out branches. Transplanted into orchards, they begin producing heavily when three years old. The usual period before young olive trees bear a crop is seven years.

The treatment sounds farfetched but George C. Warner of Pasadena, Calif., one of the first investigators of synthetic plant hormones, who now operates a laboratory in which various growth-promoting substances for agriculture are manufactured,

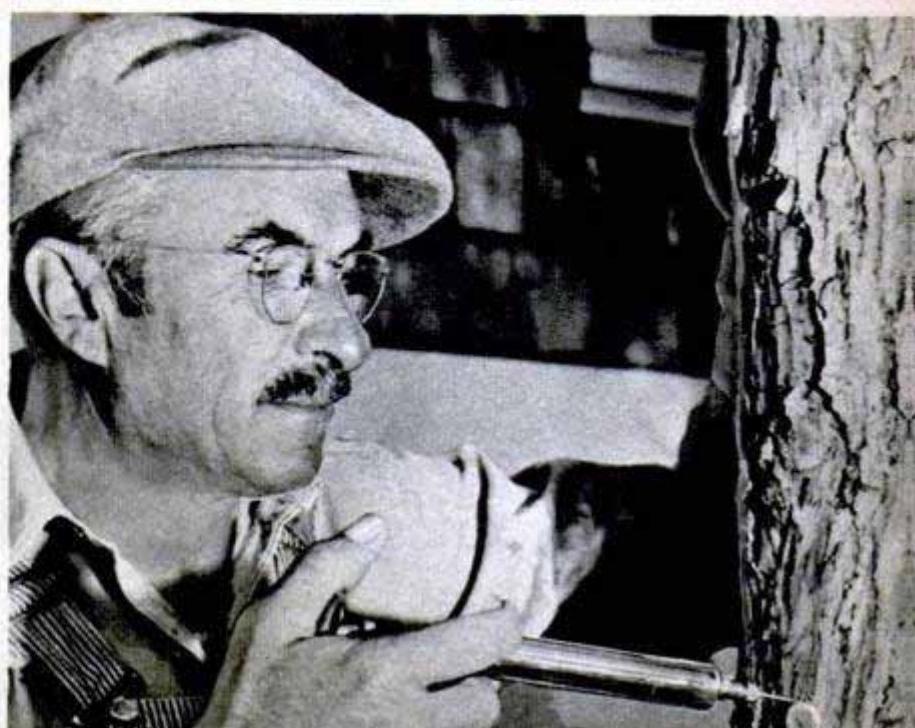


can cite dozens of other instances of what the chemicals can do. Two years can be saved in bringing a young apple orchard into production, for instance, by using treated cuttings instead of seedlings.

In fact, Warner says almost any cutting that has live bark can be rooted and made to grow although, with some species, this may not be the cheapest method of reproduction. Citrus trees such as oranges and grapefruit can be started more easily by other methods. Peaches and some other trees, too, usually are grafted onto root stock that is sturdier than their own, and so the treatment for rooting of their cuttings isn't recommended.

On the other hand, the method is a practical way of increasing production in species that don't respond well to budding or

Hormone capsule (left) is inserted in hole bored into sapwood, then corked (right) and given shot of water



Segments of limbs from a rosebush after hormone treatment are planted in sand for rooting without the usual 30-day sawdust treatment. Each piece will produce bush

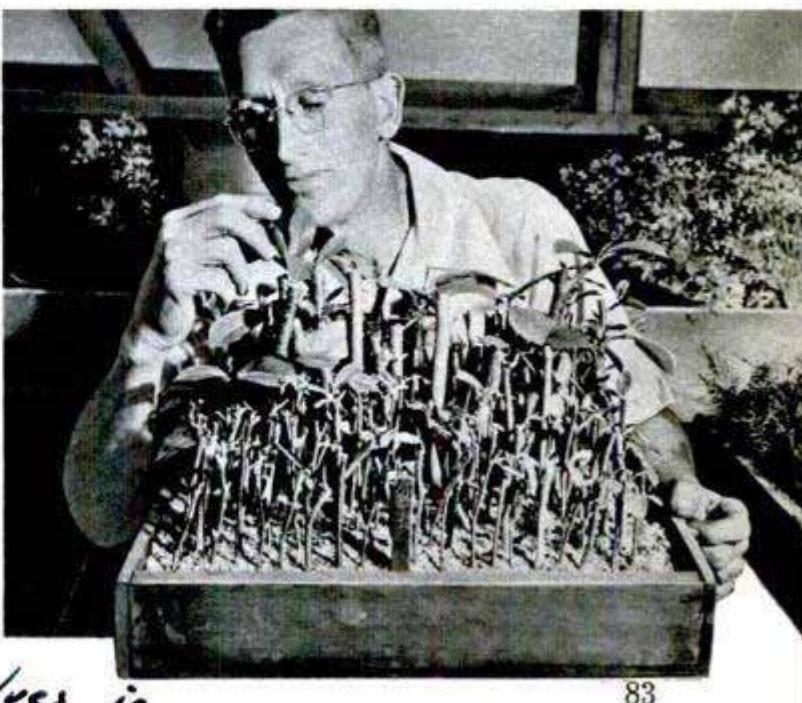


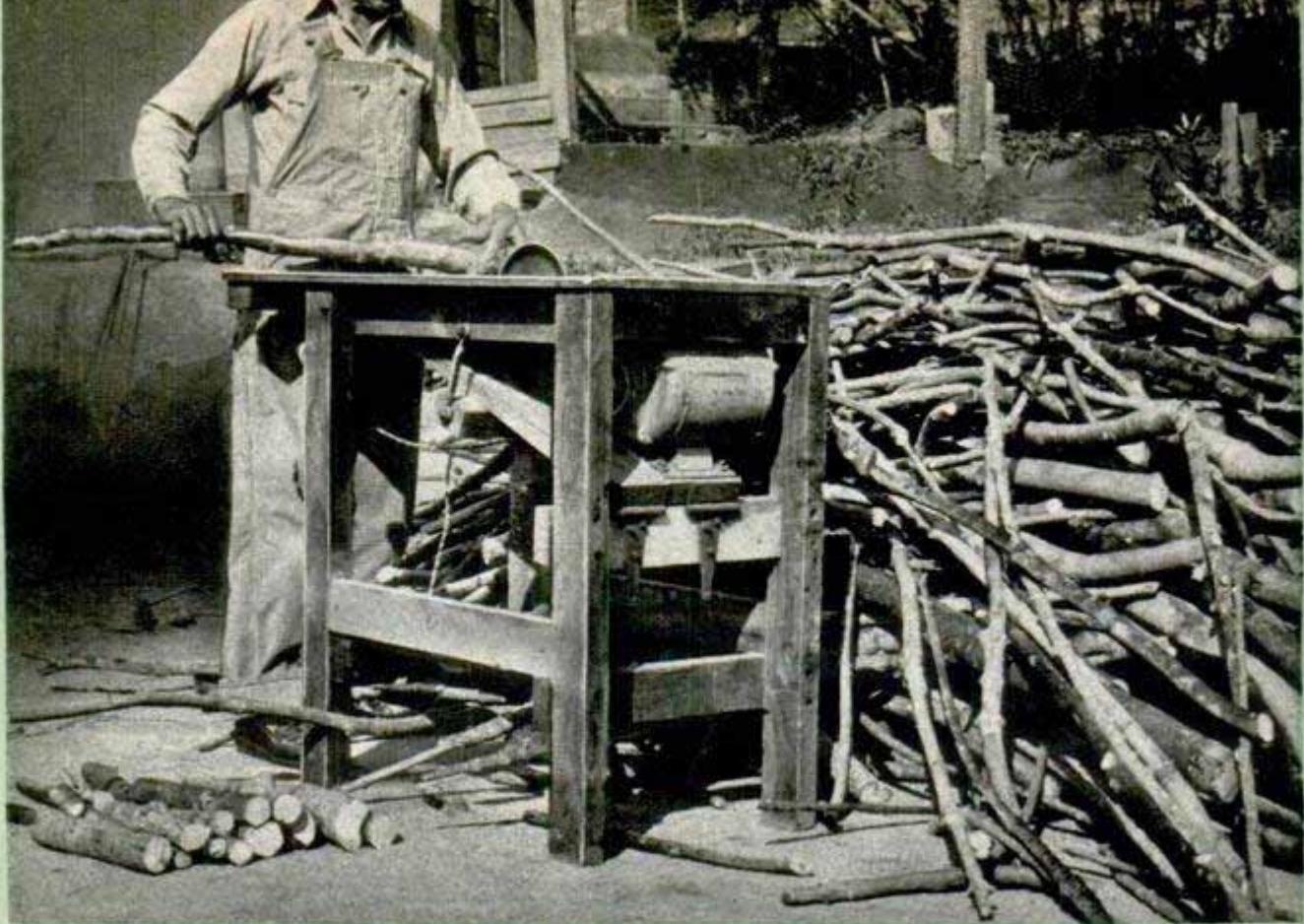
grafting and whose seed germination is poor or extremely slow. The macadamian nut tree of Australia falls into this group and yet now, by rooting its cuttings, the trees are being grown commercially. Another example is the cinchona tree, the bark of which yields quinine. At present this South American native grows mainly in the wild state. Tests indicate that its cuttings can be rooted quite easily and it seems possible now to cultivate the trees in orchards, eliminating the haphazard harvesting of wild trees.

If you'd like to raise a tree from a cutting, here's the way Warner suggests you do it: Don't use the new growth at the tip of a branch but cut off a piece of the hardwood that's at least a year old. The cutting should be about a foot long, trimmed of any recent growth, and may be from a quarter to several inches in diameter.

Soak one end of the fresh cutting to a depth of several inches for 24 hours in a solution of $\frac{1}{20}$ gram of indole acetic acid

One magnolia shrub produced cuttings below which were treated with hormones before planting in sand. At 10 weeks cuttings are rooted and growing leaves





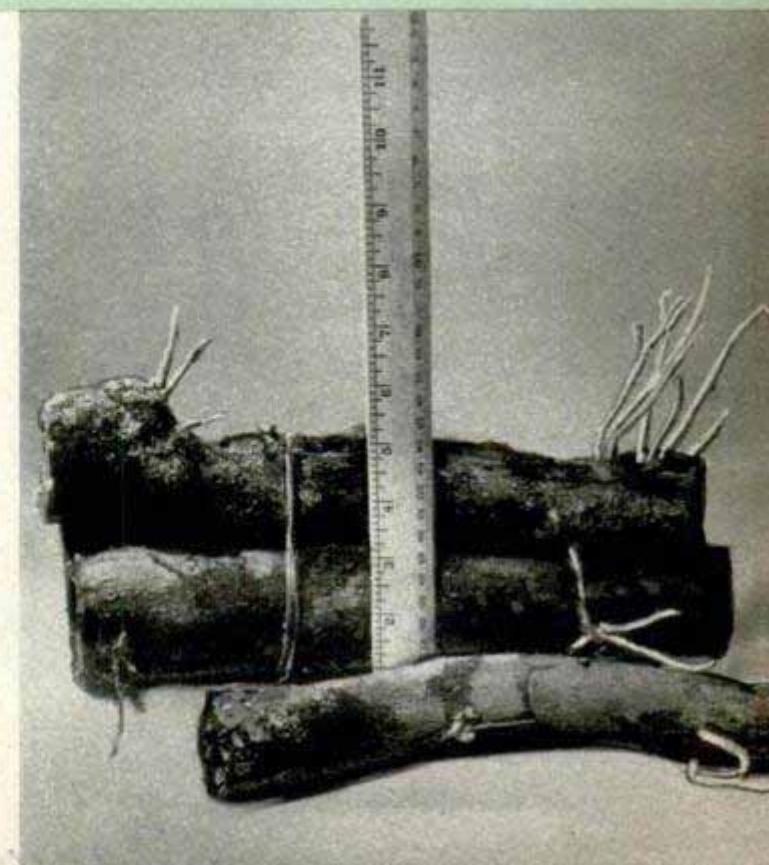
Pruned limbs from olive orchard are cut by power table saw into one-foot lengths to make "hormone" cuttings

mixed with one gallon of water. The solution should be mixed fresh before use. Too strong a solution or too long a soaking will cause the base to rot instead of rooting. Indole acetic acid is cheap in the minute quantities needed and may be obtained from most large drug concerns.

Next, bury the cutting in moist sawdust

placed in a corner of a shed or some other dark spot. Within 30 days or so, depending on the weather, the bark will begin to swell, callus and grow over the base of the cutting. Or it may send out a few shoots. Gunny sacks or clean sharp sand may be used instead of sawdust, the object being to keep the cuttings moist and dark during the

Olive-tree cuttings are soaked for 24 hours in an acid solution (left) and in 30 days (right) sprout roots



period when the tiny roots are taking form.

After the callusing occurs, the base of the cutting should be soaked for 24 hours in a standard plant vitamin B-1 solution and the cutting should then be planted in soil with the upper half exposed. Additional vitamins should be applied once a month for three months in the irrigation water. By that time the new tree will be well started and you can give it ordinary care.

Greenwood and the softwood tips of branches can be started with an even more dilute solution of acid, after which they may be planted immediately. Hardwood cuttings from trees are best started during the tree's dormant period. Green cuttings, on the other hand, grow best when cut right after the time when the new growth has matured, say about July.

One of the things for which root hormones are being used now is for the treatment of mature trees that are in poor health. Often an ailing tree can be restored to vigor by irrigations or injections of hormones and vitamins. The root hormones force the tree to send out new feeder roots, increasing its capacity to take on nourishment, and the vitamins help the tree to absorb the added food. The materials do not substitute for fertilizer and other nutrients, of course.

Warner tells about a back-yard peach in New York State that never had produced well until several years ago, when it received an injection of root hormones. The tree had a trunk eight inches in diameter and its usual crop consisted of 10 or 11 peaches. After treatment, the tree bore $1\frac{1}{2}$ bushels the first season and eight bushels

the second year and in the meantime grew about a third larger. It grew so fast, in fact, that the bark split along the trunk, a condition that the tree remedied by growing new bark.

In New York, too, less than a spoonful of chemicals restored life to a spruce that was slowly dying. Used year after year as an outdoor Christmas tree, the spruce was losing its foliage and its lower branches had collapsed and were lying on the ground. Within three months after an injection of materials was made through its bark the tree was in flourishing condition again. The lower branches had regained their strength and the foliage was once more healthy and dark green.

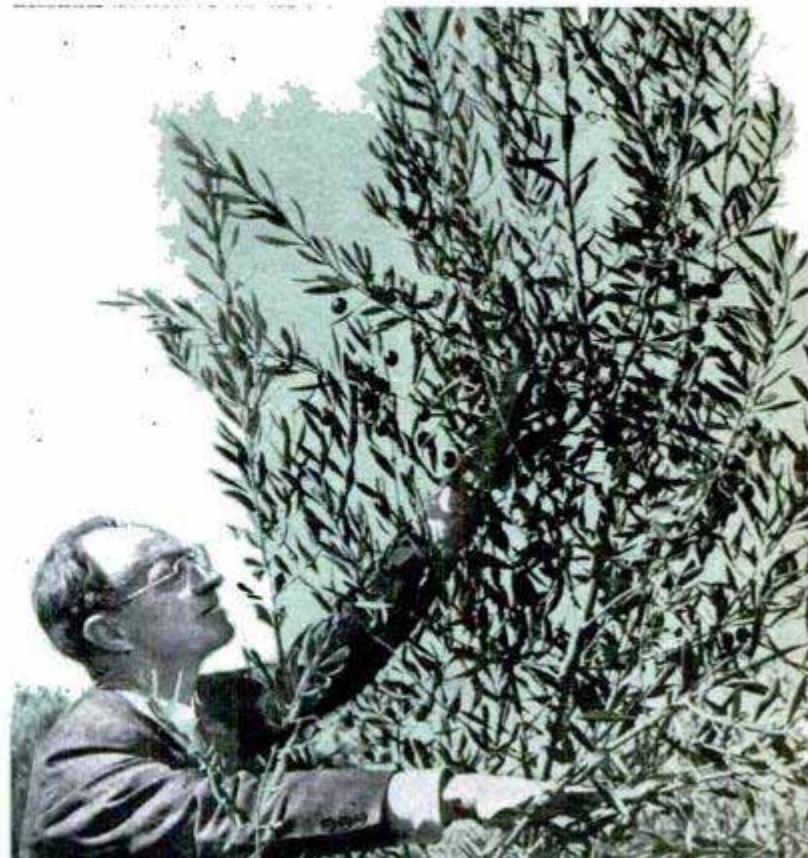
Hormones are not a cure-all and have no effect on trees that are virtually dead to begin with or that are suffering from an acute soil deficiency. When a soil deficiency is not too great, however, the new feeder roots that the tree produces often enable it to reach enough of the food that it needs to remain in health.

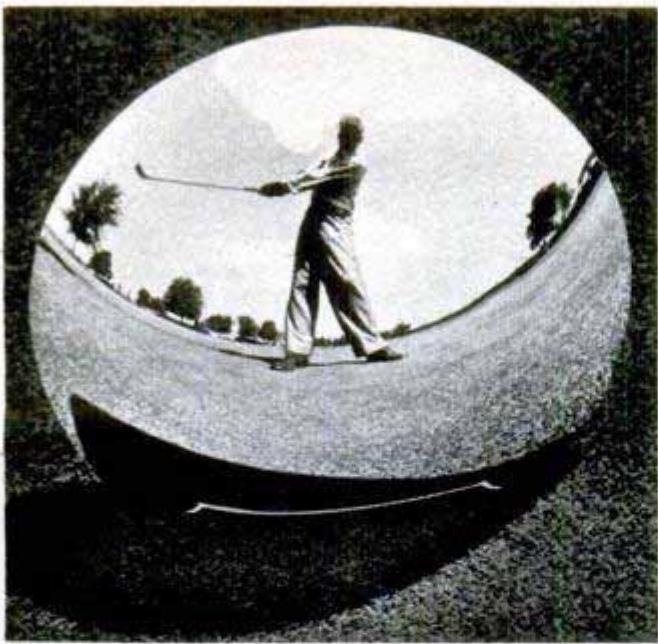
The so-called yellow virus that afflicts many cherry orchards in New York is ascribed to a soil deficiency. In some cases, this has been counteracted by hormones. One 14-year-old cherry orchard was producing so poorly that its owner was ready to yank the trees out and as a final measure a number of the trees were injected with a root hormone. That summer the test trees produced eight inches of new growth at the tips of their branches and bore a good crop while the untreated trees produced no new growth. Today, all the trees

(Continued to page 240)

Left, three months after treated cutting is planted it

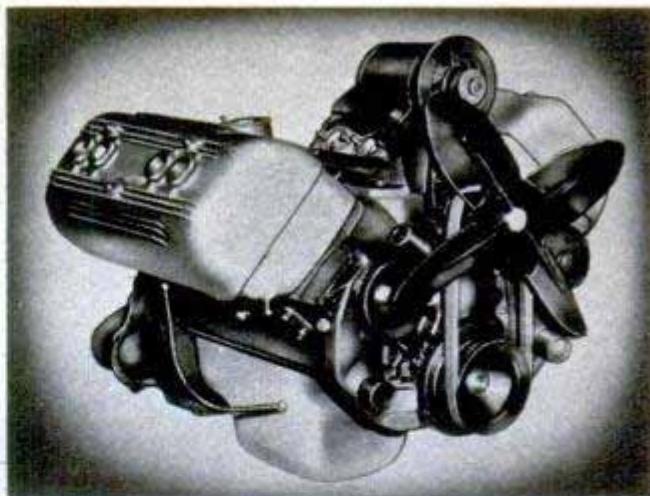
sends out new branches; right, 3-year-old olive tree





Golf-Swing Mirror

Golfers can stand in front of a new convex mirror and study their form from back-swing to follow through. The reduced image on the convex surface makes it possible to see the club and the body from head to toe during the swing. An adjustable easel can be set on the ground at any desired angle to hold the mirror, which is made of chrome-plated steel. The golfing aid measures 11 inches by 9½ inches deep.



Conversion Unit for Ford V-8 Raises Horsepower to 160

Overhead-valve conversion units for 100-horsepower Ford V-8 engines provide an inexpensive power plant in the 160-horsepower range. The unit was designed for industrial, marine and trucking requirements and — of course — racing and hot-rod enthusiasts. Principal parts include a thermodynamic high-efficiency cylinder head, hemispherical combustion chamber and radially inclined overhead valves with no change in the Ford's compression ratio. The inclined overhead valves allow a large inlet port. This unit can be installed in six to eight hours by any Ford mechanic.

Planet Pluto Has Its Measurements Taken

For the first time, the planet Pluto has been accurately measured and as a result many textbooks and encyclopedias will have to be revised. The planet, almost 40 times as distant from the sun as the earth is, has a diameter of 3600 miles. Previous estimates indicated that its diameter might

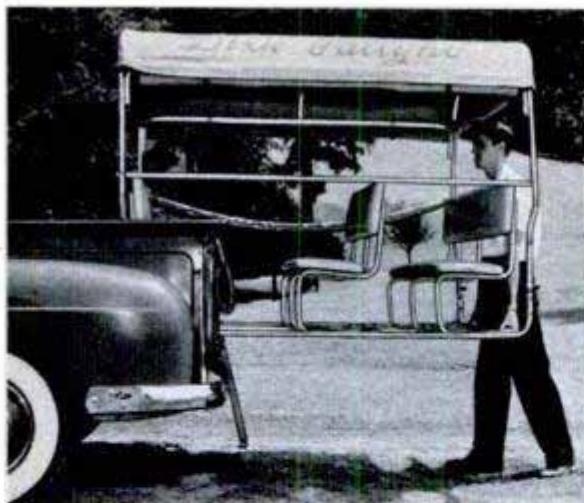
be as great as 7000 miles. The mass of Pluto is about one tenth that of the earth, making it 10 times smaller than previous estimates have claimed. The measurements, made on the 200-inch telescope at Mount Palomar, Calif., were performed by Prof. Gerard P. Kuiper of the University of Chicago.



Car-Trunk Soda Fountain

One filling of a new midget soda fountain makes the equivalent of 32 cases of soft drinks. It is compact enough to fit in a car trunk and weighs only 75 pounds. A container filled with CO₂ gas supplies pressure for a four-way dispensing head that delivers two kinds of soft drinks and two pressures of soda.

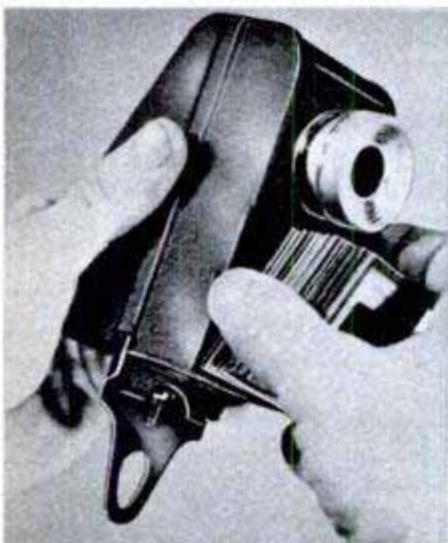
More than one third of the lead now used in the United States is salvaged from scrap.



"Station Wagon" From Pickup Truck

Ordinary pickup trucks become "station wagons" when a new seat-and-roof unit is slipped into place. Handled as a single unit, the accessory consists of a tubular framework, three seats, a canvas roof and side

curtains. It can be lifted into place by one man. The sides have plastic windows and roll down to make the unit waterproof. Off the truck, the unit can be used for summer shade on the lawn or beach.



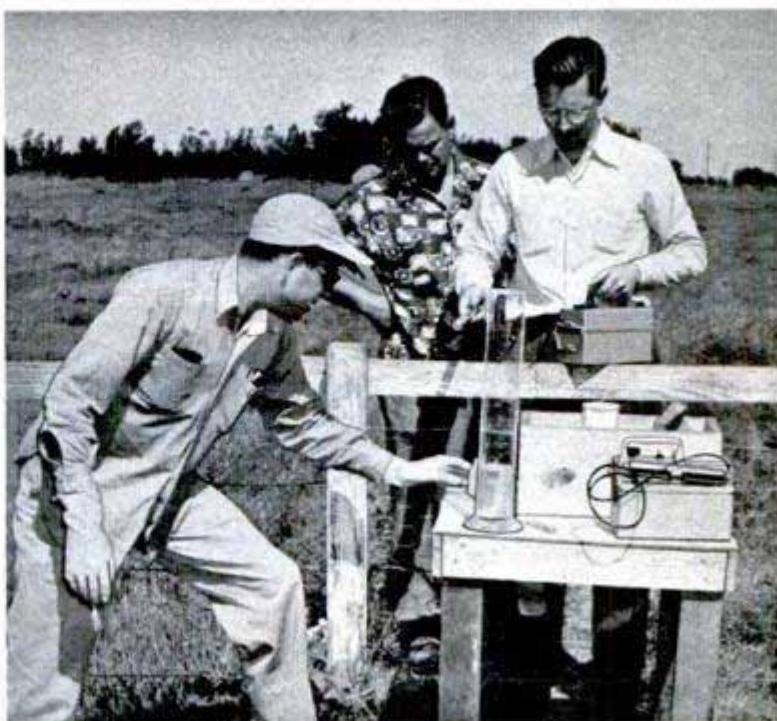
Push-Pull Viewer

All that's needed to change slides in a new hand viewer is a simple push-pull motion that moves the transparencies from a 20-slide magazine into viewing position. When each slide is withdrawn, it is returned to the magazine in proper sequence. Once the slides have been loaded in the magazine, they can be viewed repeatedly without reloading.

Tagging Mosquitoes

Atomic science is going to war against the lowly mosquito. Out in California, mosquito larvae are "tagged" with radioactive phosphorus. Then when the larvae mature and the mosquitoes are released, their flight paths and habits can be studied because the insects are identified by their radioactive tag. From this study, scientists hope to discover improved methods of ridding the country of the buzzing pests.

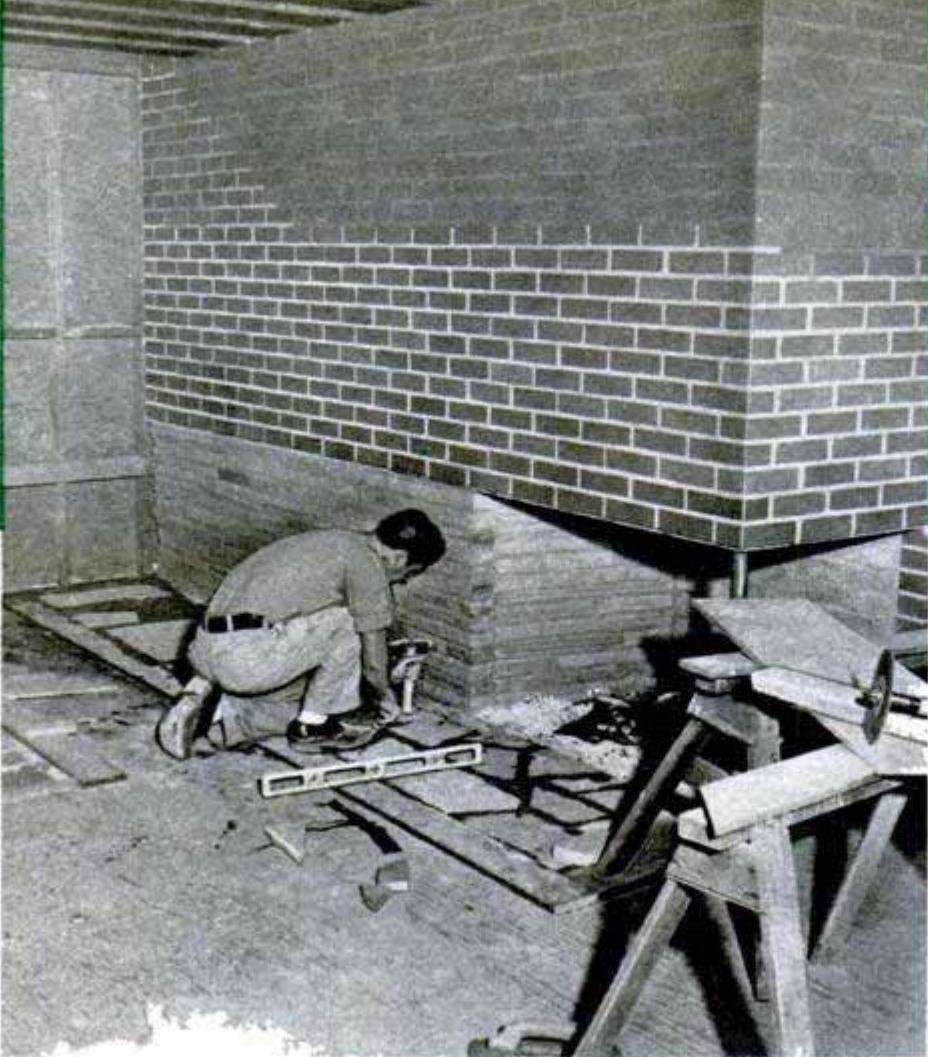
The first electric flatiron was made in 1889 by a Mr. Carpenter of St. Paul, Minn., and the first commercial electric iron was put into production in 1904 by the Pacific Electric Heating Company.



I'm building

By Tom Riley

PART 3



Forming one wall of the living room, the fireplace is part stone and part brick. Top bricks are freshly laid. Mortar will dry white as it is below

YOU'LL LIKE the Ranch House's fireplace. It is called an "island wall." Into it the editors of the Craftsman Section and architect John Whelan have put a tremendous amount of planning, incorporating today's ideas and the desires you readers have made known to the magazine.

What are the various wishes you have made? One has been for a modern fireplace, not of extremist design but a modern touch with traditional materials. You have asked that the furnace flue be included to save expense of a separate chimney, always a practical idea. An excellent suggestion has been your request for a fireplace that is not "dead" without a fire. Come to think of it, why should the fireplace be just a sooty hole in a wall when it isn't used?

These things have been accomplished. You have also requested modern stonework in the fireplace. The best grades of fieldstone are invariably more expensive to buy and have laid than brick, but here the best can be used inexpensively because each stone is shown to advantage. The hearth is a masonry job so simple you can easily do it yourself after the fireplace is built whether or not you personally lay the rest of the masonry.

I had fun helping with the hearth but I steered clear of the fireplace because I haven't had the slightest experience with

masonry. Probably many of you will have your fireplaces built by an expert as I did, but for you who have had a little experience with mortar the island wall is being detailed by the editors to show the position of every brick. And especially good is the fact that this corner or Swedish fireplace is easier for the amateur to build than

the ordinary. There is no corbeling or curving of the firebrick and no tricky throat.

There's another request you have made and it's the real reason for the island wall. You have consistently asked for the brick interior walls so often featured today in the better homes. Both foundation and brickwork for such are expensive, but the island-wall fireplace solves that problem. The Ranch House's fireplace rises like an

Even before her home is finished, Mrs. Tom Riley is kept busy sweeping up the sawdust and wood shavings



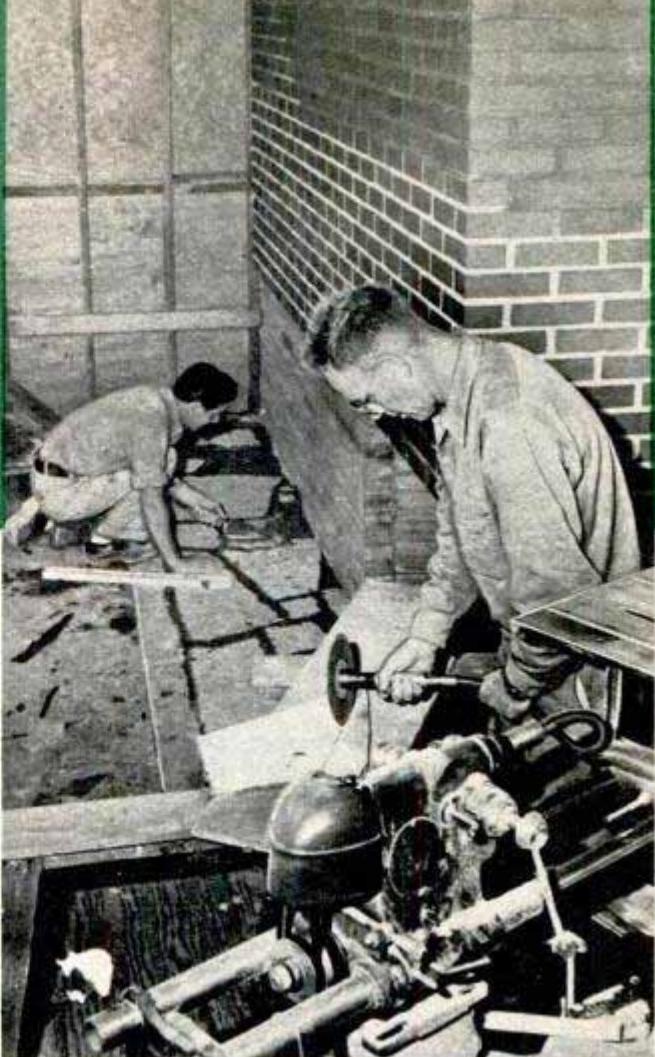
the Popular Mechanics PLYWOOD ranch house

Laying the hearth is fun and requires little skill. The stones are quickly cut with this abrasive wheel

island through the floor at the center of the house. A seven-foot brick wall rises alongside, the two rising together to the ceiling to form the partition between the kitchen and living-dining area. At a minimum of cost the wife gets a brick kitchen wall as well as a brick wall in the living room. You might say the secret is that nowhere is brick hidden behind plaster. By actual count there are no more bricks in this wide expanse than in most ordinary fireplaces.

I am also delighted by the simple concrete foundation for the island wall (had to pour it myself) and by John Whelan's architecture in designing this fireplace so that the final effect is to enlarge the living room rather than reduce it.

The window and door frames of the Ranch House are definitely modern construction. Instead of purchasing expensive millwork you can make them yourself as I am doing, the modern framing being designed expressly for that purpose. The combination shop tool we are using or any other good table saw is all that is necessary

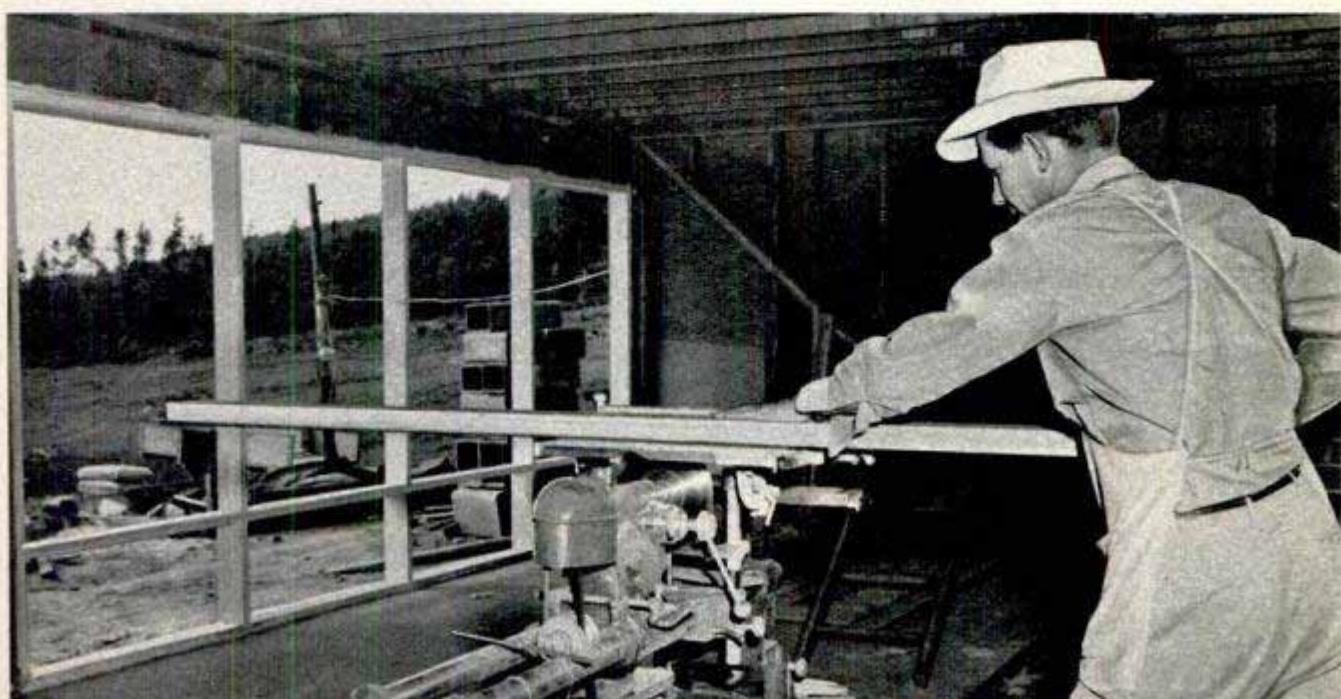


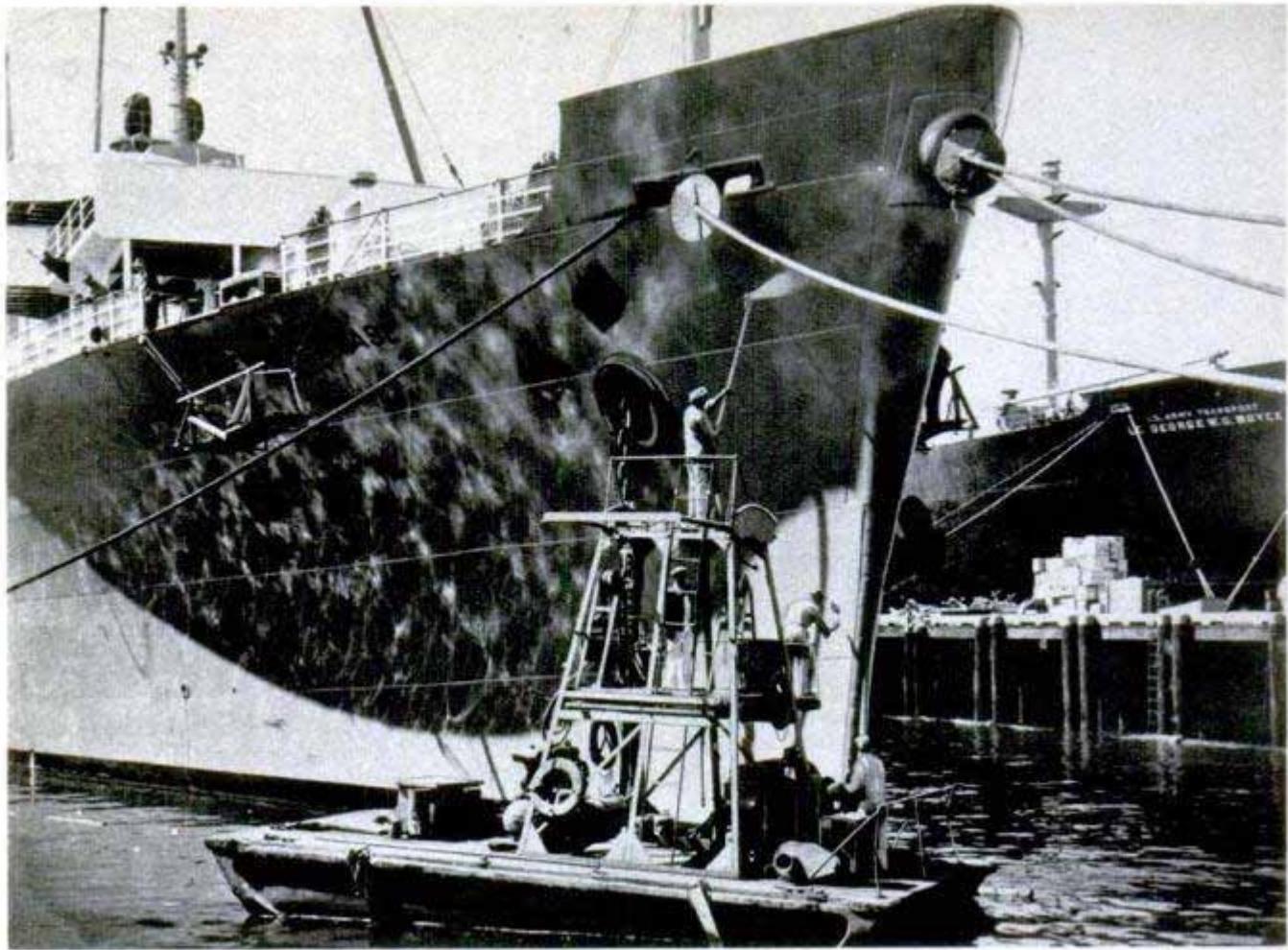
and you will save the cost of your power equipment on the window framing alone.

This framing is all made from 2 by 6 lumber. The wood dividers between the windows are the same and they act as wall supports or studs, reducing the headers required in the wall above. I have been intrigued by the way you weatherseal these modern frames. We assembled the frames on the subfloor of the house (the easy way),

(Continued to page 246)

Tom made the window frames, saving the cost of the power tool. Openings in rear are for living-room windows

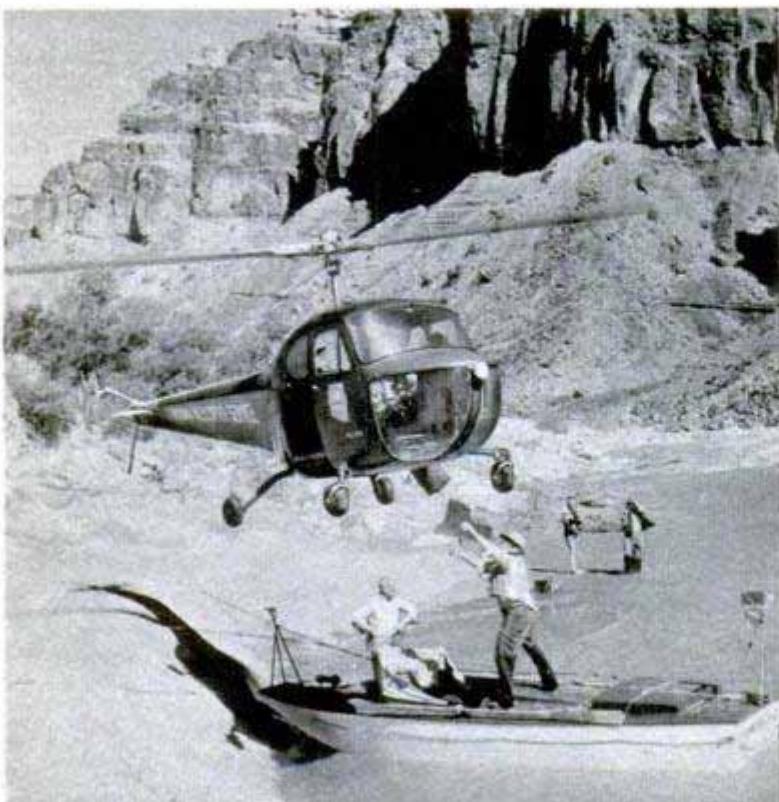




Scaffold for Floating Painters

Ship painters at the Seattle Port of Embarkation wield their brushes and spray guns from a floating scaffold that puts around the big transports and smaller craft under its own power. The scaffold has been built atop a barge-shaped vessel 36 feet

long. The vessel is propelled by a 30-horsepower diesel engine salvaged from an old tug. It cruises to any ship which is to be painted and ties up alongside. The upper platform of the scaffold can be rolled as much as eight feet beyond the side of the paint barge, placing the painter right up against his work.

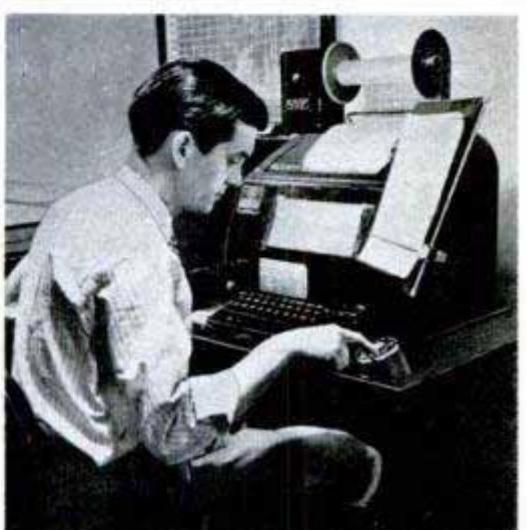
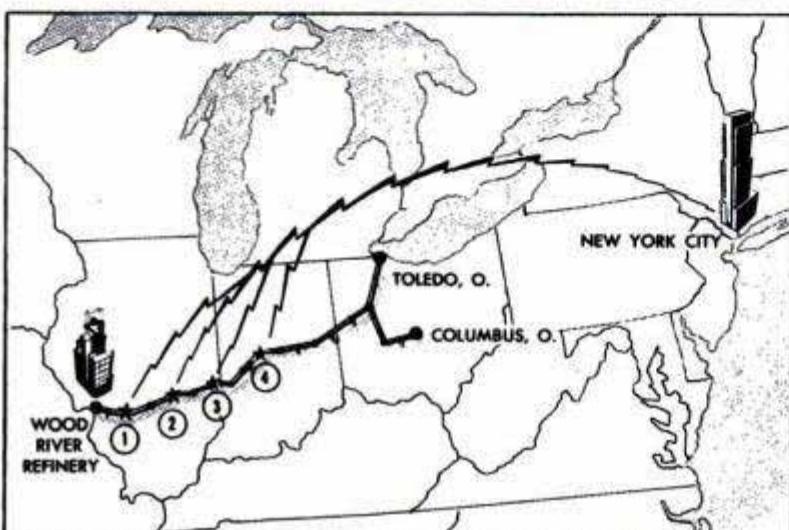
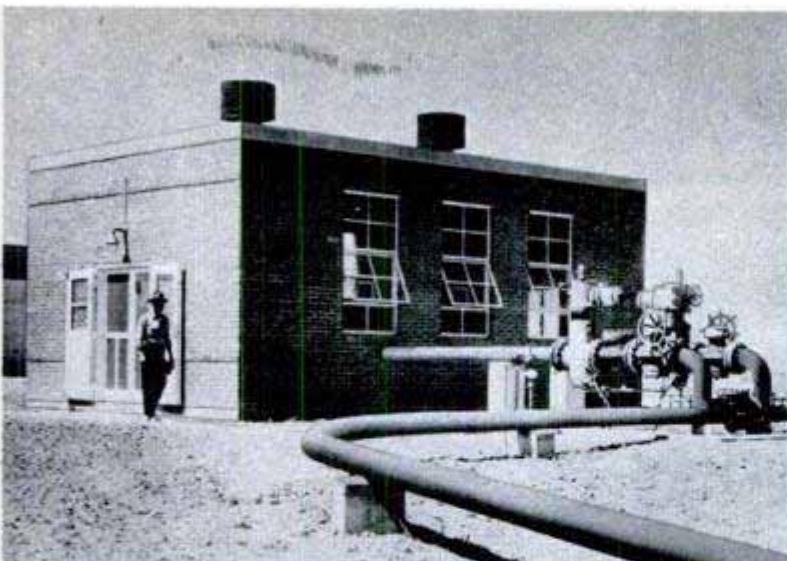


Flying Gas Station

Gasoline to refuel boats running the Colorado River rapids through the Grand Canyon is being delivered by helicopter. The aircraft hovers over the boat at prearranged rendezvous points until the fuel cans are transferred. Previously, the gasoline had to be packed in by mules over the rugged terrain to several strategic locations.

Color-Print Film

Duplicate copies of color transparencies can be made by the amateur with a new color-print film announced by Eastman Kodak. Either contact prints or enlargements can be made and processing is similar to that used with Ektacolor film. A color negative is used to make the transparent prints.



Top, each of four pumping stations requires only one man on duty. Most operations are dialed from New York. Top, right, 17-foot control board traces progress of every gallon of petroleum. Map shows location of the pipe line and its four pumping stations. Right, operator dials a code number to start or stop the pumps at a station

Dialed Numbers Operate Pipe Line 850 Miles Away

Seated in an office on the 35th floor of a building in New York, one man can dial pumps into operation and open or shut valves on a pipe line 850 miles away. Four automatic pumping stations have been installed on the Shell Oil Company pipe line between Wood River, Ill., and Columbus, Ohio, to give one New York operator complete control over various petroleum products as they flow through the tube. By dialing a code number, the operator can start

or stop certain pumps. Another code number opens or shuts valves. Still another "asks" the automatic pumping stations for a report on conditions, and a Teletype instrument immediately types out replies. In the event of a breakdown or other emergency anywhere along the pipe line, the operator can dial a number which sounds a siren at the pumping stations, summoning the one attendant who is on duty at each station.

Plants Carry "Built In" Poison to Kill

Plants which poison their deadliest insect enemies now are growing in laboratories throughout the country. Developed by a German scientist during the war, new chemicals called "systemic poisons" are mixed into the soil in which young plants are grown. Through a method not yet understood the poisons travel through the plants into their leaves to kill marauding insects. Gradually, the effects of the poison

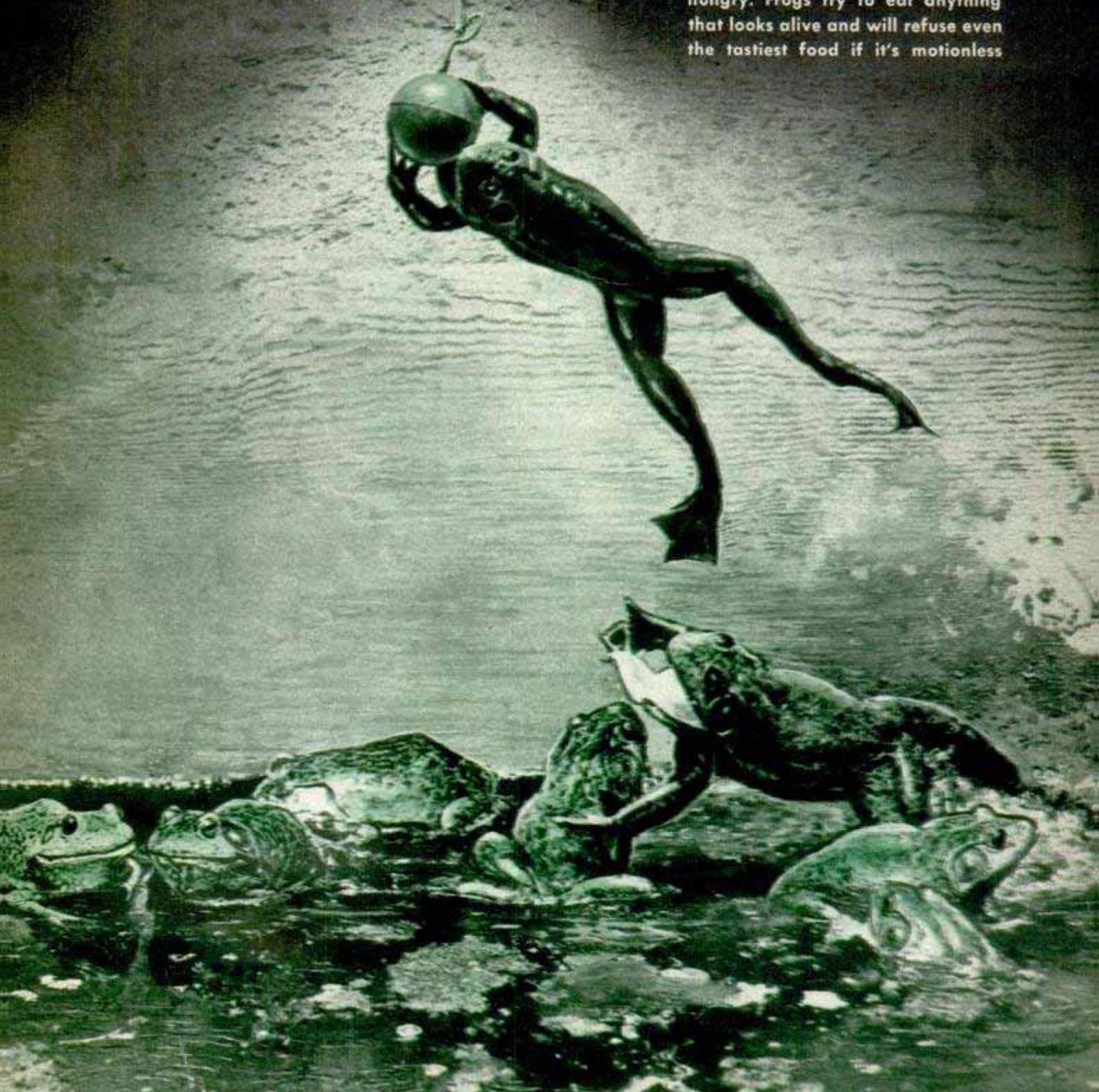
Damaging Insects

disappear, and after the plant has attained a good growth the chemicals are harmless or may even become beneficial in feeding the plant. Systemic poisons have proved effective in killing such pests as the cotton aphid and the red spider mite.

Waxes processed from oil shale may help meet demands for paraffin waxes made from petroleum.

HOUSEKEEPER FOR A *Million Frogs*

Ball-playing frog is not actually playing a game of catch. He's just hungry. Frogs try to eat anything that looks alive and will refuse even the tastiest food if it's motionless.



By Ewart Thomas

THERE isn't a main-line railroad within miles of Harold Lee's frog farm and yet on a summer evening you'd swear that a couple of diesel locomotives were rushing past the front door. "A million frogs can make a lot of noise," Lee says.

Counting tadpoles, Lee possibly does own that many frogs. In any event, he's one of the few men who have made a success of raising them commercially. At his five-acre froggery near Ventura, Calif., he has thousands of grown frogs that are ready for the market and tens of thousands of tadpoles that either will be eaten by the big frogs or that will grow up to be frogs themselves. Lee counts on a good percentage being used as food.

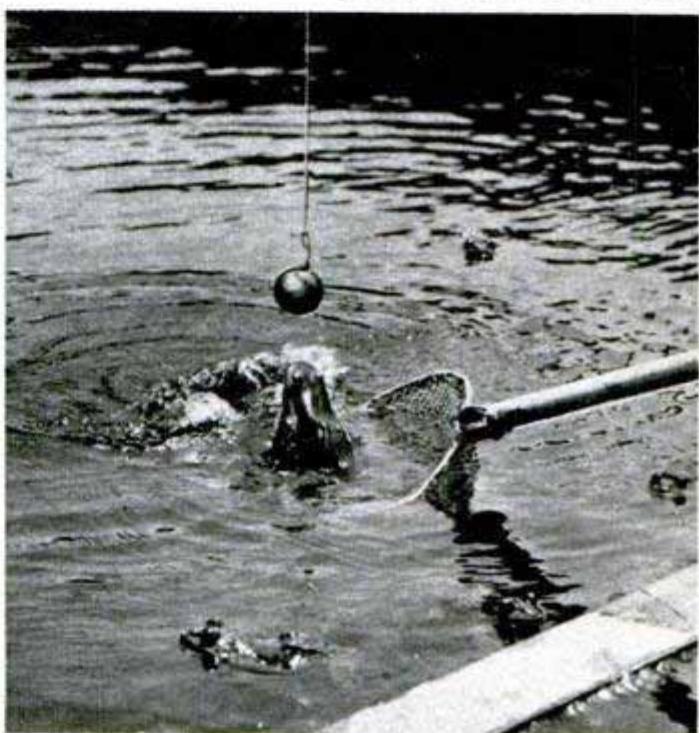
Frog meat is an expensive delicacy that compares somewhat with chicken or turkey in flavor. There never has been enough of it on the market to satisfy the demand. Much of the available meat is shipped here from abroad; some frogs are obtained for the market by hunters, who spear them after dark in the swamps of Louisiana and other Southern states.

Literally hundreds of people have tried raising frogs commercially but the history of frog farming has been very disappointing. Many who have tried it have concluded that frogs don't mature successfully except in the wild state. A

Harold Lee uses a long-handled net to catch frogs in pond with a jungle setting which protects them when they leave the water



Lee got this frog to pose for his picture before leaving for market. He will yield about $\frac{1}{2}$ pound of meat. Below, rubber ball dangled above water attracts frogs from all directions. Moving objects are food to them



few men, however, seem to have found the secret of high production and Lee is one of them. He'll talk volubly about many of his problems but there is some knowledge that he won't give away.

He developed his present "domesticated" strain from giant wild American bullfrogs. These grow to large size in two years. Lee keeps his amphibious little animals in a group of artificial ponds and pools that consist of large shallow concrete tanks. In all, he has 150,000 square feet of water area and the pools are fed by well water. The overflow from the pools is used to irrigate his fruit orchard. Water hyacinths and other aquatic plants grow on the surface of the pools and there are jungles of pussy willows and other shrubs along the borders.

When you inspect one of the pools in the middle of the day, there may not be a frog in sight. Lee brings them to the surface by dabbling the water with a small rubber ball at the end of a line that is tied to a fish pole. Frogs gather around in a rush, jumping and striking at the ball.

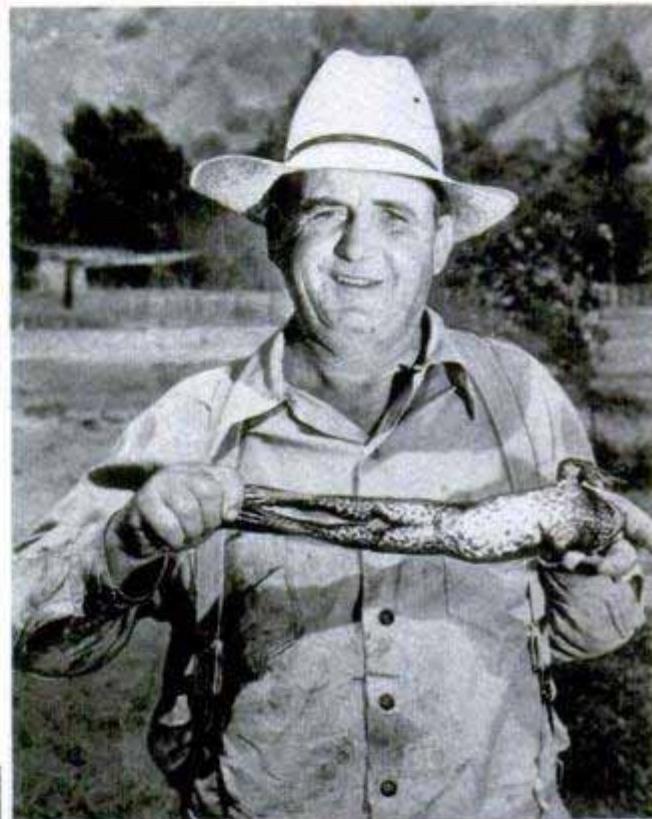
"They think it's something to eat," he explains as he deftly slips a long-handled net under a big one. "Frogs won't eat any food that isn't moving and they'll try to eat anything that is in motion." In five minutes he captures a dozen frogs and in another quarter of an hour he has them dressed and skinned for a customer. A good-sized frog yields up to half a pound of meat and the meat sells for \$1.85 a pound. Lee also sells quite a number of mature live frogs that are to be used as breeders.

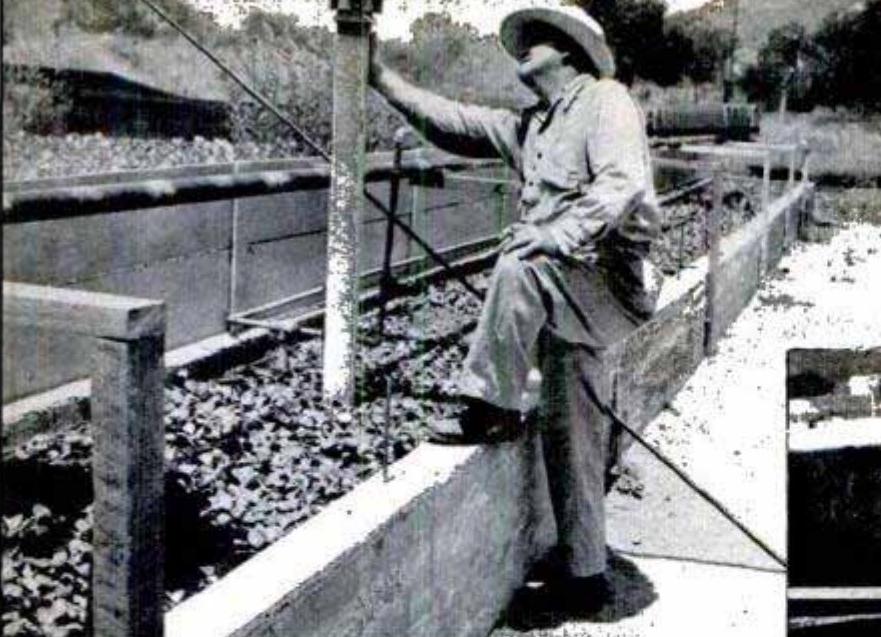
Live frog food, consisting of crayfish, small goldfish and minnows, is raised in long tanks. Fish eat vegetation so frog farm is virtually self-supporting

Frogs of market size live in walled ponds from which they can't escape. Smaller frogs have separate ponds and the various sizes of tadpoles are kept in still other tanks. Frogs are cannibalistic and it's best to segregate them according to size.

Eggs and tadpoles have a host of hungry enemies and, in the wild state, only a few score frogs may grow from each spawning that contains 10,000 eggs or more. Lee estimates that he has just about reversed this proportion. If he didn't use most of the tadpoles as food he'd have more frogs than one man and a helper could handle.

Lee holds a typical two-year-old specimen raised on his farm. Big frogs that are now raised commercially yield considerably more than meat from hind legs





Lee inspects exhaust stack from underwater heater he designed to warm an outdoor pool for tadpoles

Frogs spawn in the summer and the eggs are found floating on the water. Lee transfers the masses of fertilized eggs to the tanks of a special indoor hatchery where he keeps the water temperature at just the proper degree and where the water is agitated by the sprays and drips that leak continually from a bank of overhead pipes.

When tiny tadpoles hatch from the eggs, they are kept indoors for a time and then are transferred to out-of-door ponds. One of the outdoor tadpole tanks is heated in cold weather by a gas burner that is built into its foundation.

The reason most people who try to raise frogs fail is because they do not provide the right foods, especially for the little tadpoles. Lee's early losses were almost 100 percent. Finally, he built a glass-bottomed "look box" and spent days watching tadpoles in a swamp to find out what they were eating. He studied the feeding habits of larger tadpoles by placing a few of them in a glass-walled aquarium.

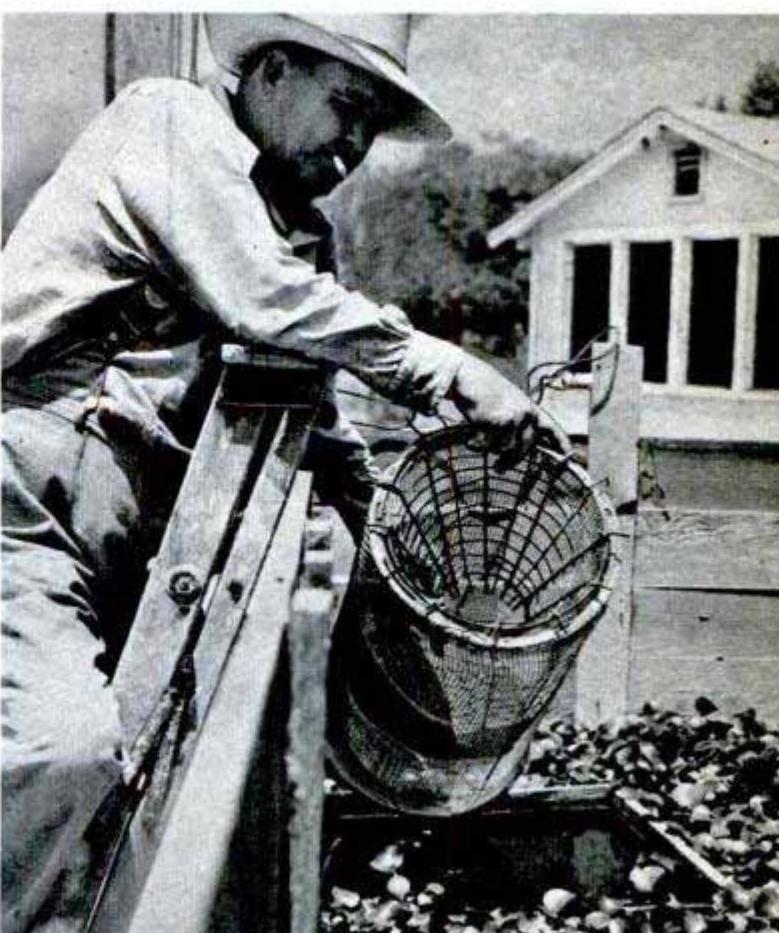
Mature frogs simply won't touch inanimate food and so Lee first tried to feed them with small pieces of meat that he dabbled in the water at the end of a string. That worked all right, but he was spending all of his time at the chore. Now he uses live foods similar to those found in the swamps and rivers. Besides tadpoles, frogs also thrive on crayfish, small goldfish and minnows.

Lee raises small fish in several tanks that he uses as hatcheries. He seines out the fish at need and transfers them to one of the frog pools. Similarly, he breeds crayfish. The crayfish and minnows eat the vegetation that grows in the tanks and so the frog farm is self-supporting with hardly a cent being spent for food or supplies. "I just sit back and watch my frogs grow to market size," the proprietor says.



When frogs get used to a person they tame easily, Lee says as he sits down among some of his prize specimens. He has worked with frogs since he was 15

Wire trap is lowered into a hyacinth-covered pool inhabited only by crayfish, a favorite frog delicacy. Live food is the secret of running frog farm



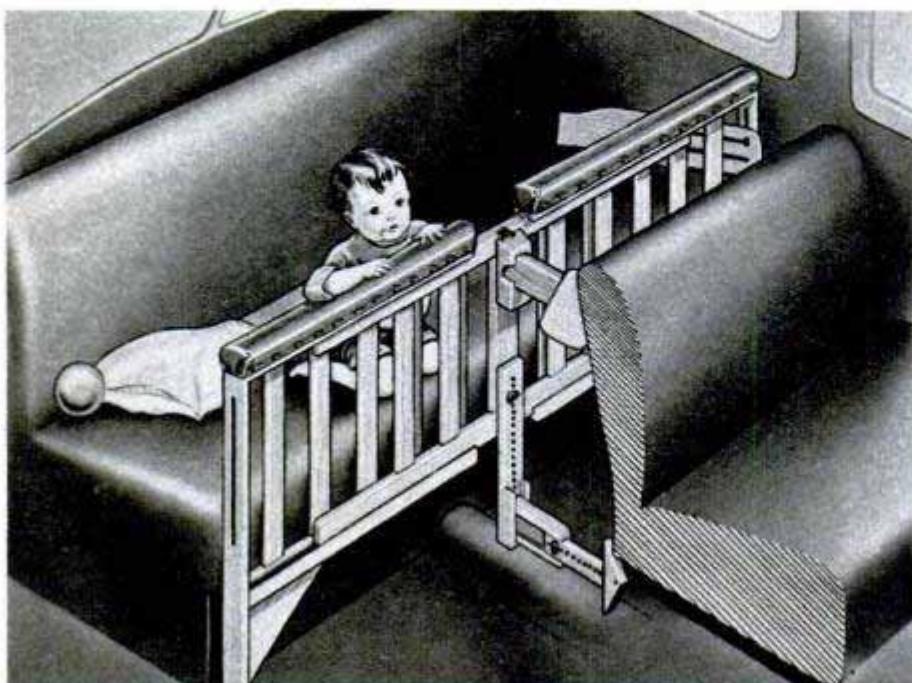


Eye-Cup Peep Sight

You're on target faster when you use an eye-cup peep sight that eliminates the chore of lining up front and rear sights. Instead, you merely put the front sight on target and that's where the bullet strikes. The rubber cup mounts on the stock of the rifle where the hunter can place his eye against it. Spring action in the sight eliminates recoil. The eye cup also shuts out distracting light rays, making it possible to aim within 10 degrees of the sun. The sight folds down when not in use.

Short Towing Bar Fits Most Cars

With an easily installed towing bar, one garage attendant can pick up a car for service and redelivery. The short bar also can be carried by the car owner in one corner of his luggage compartment for use in emergencies. On each end of the bar is a clamp designed to fit virtually all cars regardless of their make or model. The clamps are pivoted to give play to the towing mechanism.



Back-Seat Fence Makes Crib in Car

Baby can sleep or play safely on the back seat of the car when protected by an adjustable fence. Easily installed in any car, the fence is padded on the top rail to prevent bumps. It can be installed or removed in a few seconds and comes apart to fit neatly in the trunk.

Since 1939 the United States has expanded its steel production by more than 47 million tons, an increase of 90 percent in 11 years.

I rode the Airlift to the Orient

DOOR ONLY
ELEVATOR WELL



Nine-litter rack made of iron pipe fits on C-74's elevator and saves time loading and unloading wounded

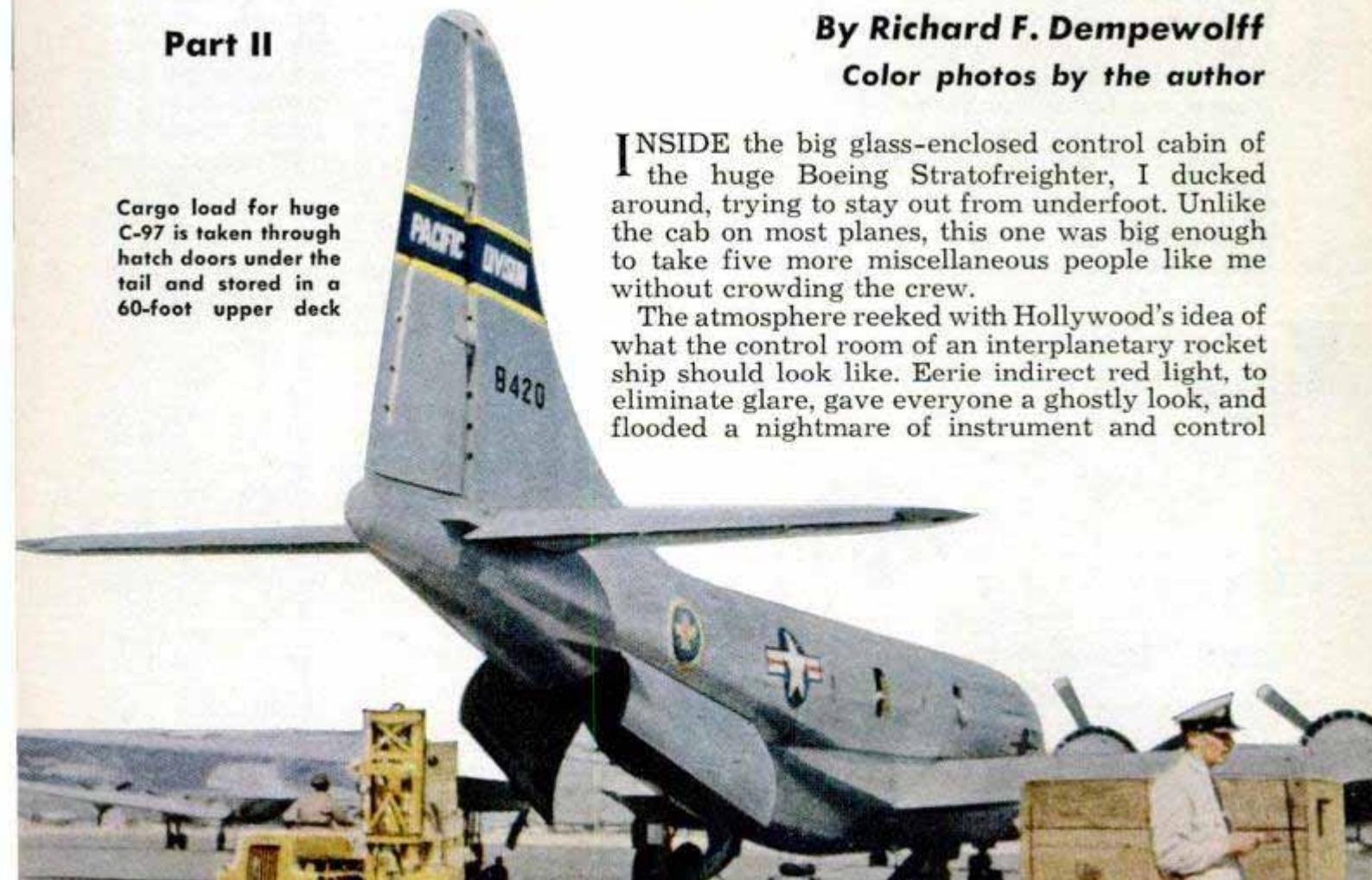
Part II

Cargo load for huge C-97 is taken through hatch doors under the tail and stored in a 60-foot upper deck

By Richard F. Dempewolff
Color photos by the author

INSIDE the big glass-enclosed control cabin of the huge Boeing Stratofreighter, I ducked around, trying to stay out from underfoot. Unlike the cab on most planes, this one was big enough to take five more miscellaneous people like me without crowding the crew.

The atmosphere reeked with Hollywood's idea of what the control room of an interplanetary rocket ship should look like. Eerie indirect red light, to eliminate glare, gave everyone a ghostly look, and flooded a nightmare of instrument and control





Hydraulic ramp used for loading wounded at Haneda field, Tokyo, can be adjusted to meet sill of any plane

panels that covered every square inch of wall space and half the overhead. Hundreds of luminous needles wavered in the semidarkness. Little white button lights flashed off one at a time as pilot, co-pilot and flight engineer shouted gibberish back and forth above the crashing engines, running down a take-off check list of some 125 items. It took almost 20 minutes.

Then, with a roar that set my back teeth vibrating, 14,000 horses in the plane's four big Wasp Major engines came alive. In a flood tide of shattering sound we catapulted down the runway of Fairfield-Suisun Air Force Base near San Francisco and soared into the night, on the first leg of the longest airlift the world has known—6700 miles to Tokyo, via Oahu and Wake Island.

Just half a day earlier, this brand new C-97A of the Military Air Transport Service—distinguishable from earlier models

Butterfly hatch doors under a C-74 open to permit plane's built-in elevator to drop from its belly. Scene here is at Fairfield-Suisun

by the radome tucked under its nose, side hatches and square propeller tips—had landed at Fairfield-Suisun as a flying ambulance, with a load of more than 60 badly wounded men from the Pacific war theater stretched out on a jungle of tiered litters that filled the top deck. Now, a few hours later, we were headed back over the Pacific for another load.

But this was no deadhead flight. The big double-deck transport had been converted into a cargo carrier and loaded with almost 25,000 pounds of high-priority cargo. We could carry a maximum of 42,000. We had three big bomber engines aboard, crates of ammunition and weapons. Big yard-square cases held fresh whole blood, processed at Fairfield and packed in jars surrounding a cylinder of chipped ice. In its insulated crate it would stay fresh at 38 degrees for two weeks—plenty of time, since it would

be at the battle front in three days or less, where its healing properties (better than plasma) would help patch up wounded GIs.

A few litters that held last night's Korean war wounded still were lashed in place along the plane's sides, hemmed in by cargo, and now were occupied by special troops, needed on the front in a hurry. Some of the men talked, played cards, ate their box lunches. Others stretched out, prepared to sleep their way across the 2400 miles of Pacific night to Honolulu's Hickam Field, the first stop—nine hours away. In two days, some of





All the flight engineer in control cab of a C-97 has to do is watch 211 instruments and gauges on panel

them would be on the battle front. If they went by surface transport, the same trip would take them half a month.

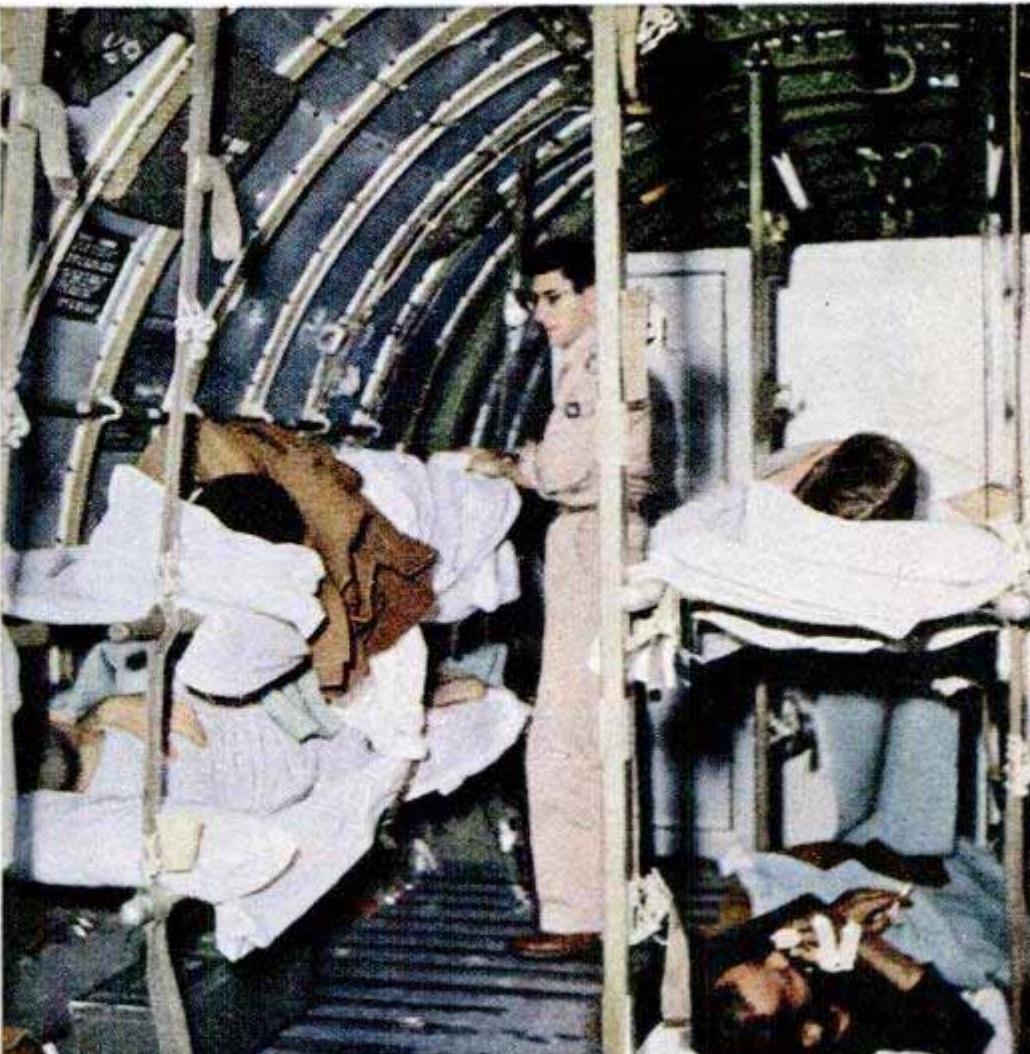
Today's convertible flying ambulances are a far cry from Napoleon's first heart-breaking attempt to evacuate wounded from battle fronts with horse-drawn litter wagons that jounced and joggled injured men to death, or became hopelessly bogged in mud, during his war with Russia. The first planes that the French used for the job in World War I were better—when they got home. Even our Air Force planes that evacuated 1½ million wounded from European fronts in World War II, didn't hold a candle to the four-engined giants now thundering across the Pacific.

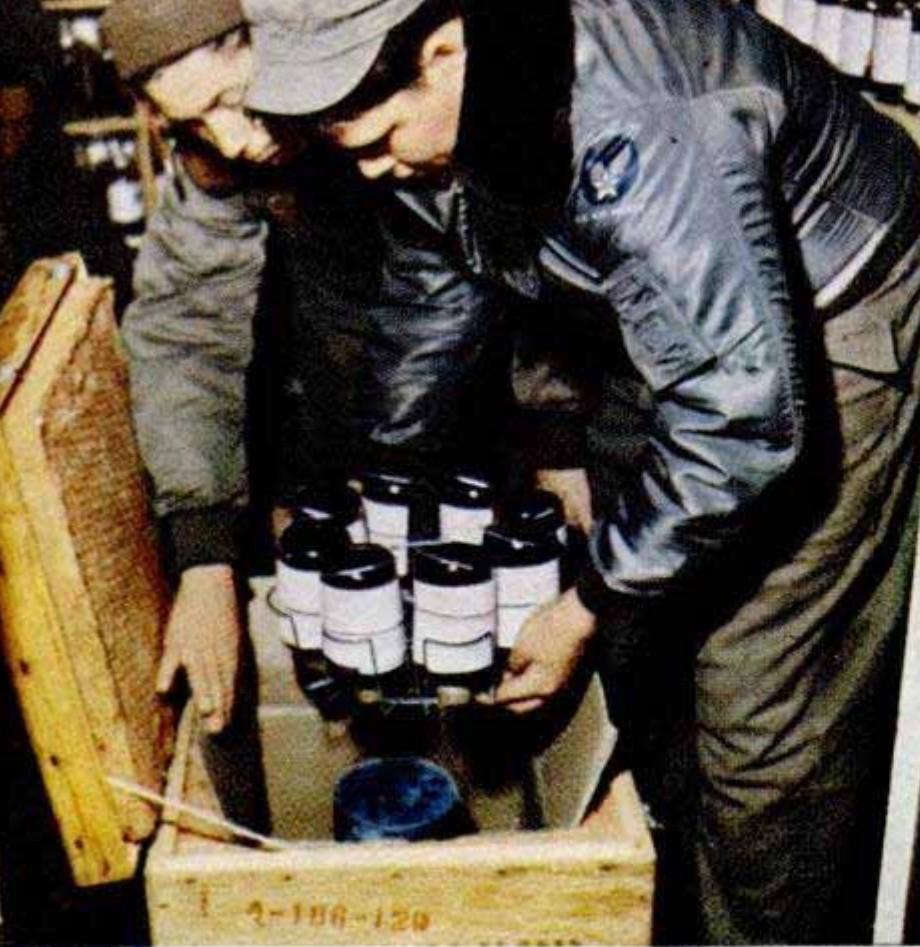
The 74-ton cargo and troop carrier we took off in that night looks more like a winged whale than an aircraft. It's one of three factory-fresh jobs just delivered to MATS. Crews have affectionately dubbed them "Anytime," "Sometime" and "Over-time." The names are

Hospital litter becomes the patient's bed aboard evacuation plane. Litters are stacked four or five high

painted in white across their radomes. Ours was the first named. An oversized cousin of the B-50 Superfortress, "Anytime" measures 110 feet from nose to tail. Her wing tips are 141 feet apart, and her tail towers a staggering 38 feet in the air. A bulging double aluminum belly encloses her decks. The top one, from control-cabin wall to the big bay doors under the tail, stretches away for 60 feet. It can accommodate 60 litters, 134 passengers, or an equal weight of cargo. By dropping two self-contained wheel ramps under the tail, men roll 105-mm. howitzers into the plane's yawning maw, or drive light tanks or 2½-ton trucks in under their own power.

The ramps work like a charm, as Boeing's project engineer will testify. When first testing them, he drove an Army "cat" (for the first time in his life) up the steel ribbons, had a palpitation as it teetered precariously on the top before dipping its nose and rumbling aboard. Then he had to see if it would back out. He swung it around and it teetered again on the brink of the hatch. It was one too many teeters for the engineer. He grabbed the overhead and swung off the seat as the cat proceeded down the ramp alone. When he saw that the thing would make it, he dropped back aboard and rode it home. Trucks and tanks, even with their treads smeared with extra-slipping testing mud to simulate battle





Jars of whole blood on way to battlefield are carried in circular racks inside a can of chipped ice. The crate is insulated

muck, were easy to get aboard after that.

Side hatches on the plane open to accommodate smaller cargo, and a tricky hydraulic hoist in the plane makes a fork lift unnecessary. That hoist, which loaded our cargo at Fairfield, can also be used for parachuting supplies right over the front lines. Attached to it are 17 trolleys that will release 25,000 pounds of equipment through the rear hatch in 12 seconds.

The plane's lower deck, divided in two by her 7790-gallon gasoline tanks and wing root, provides quarters for crew or 23 additional litter cases in the forward half and cargo or baggage aft. Already MATS medical men foresee the day when the lower deck of the C-97A will contain a well-equipped operating room. The top deck could be the ward, and litters would be lowered through a trap door in the floor to an operating table below. The result will be a full-fledged flying hospital in which, says Major D. L. Ferguson of the 1453rd Military Air Evacuation Squadron, "minor surgery and first-stage emergency treatment of wounded men can be performed en route to hospitals far removed from the fighting zone. Gone will be the job of taking wounded to base hospitals behind the lines."

Four thrumming 3500-horsepower engines hauled our new Stratofreighter through the skies at an easy 300-mile-an-hour lope. On the Pacific airlift run, with 9 to 12-hour nonstop leaps, it takes two com-

plete crews of six to man the big transport—captain, pilot, navigator, radio operator, flight engineer and flight attendant. One shift sleeps on the litters below decks, or stretches out on a row of pillows on the floor, while the other works. I took my turn on the floor that night.

There's plenty of activity in the cabin as the plane drones along at 10,000 to 25,000 feet above the cloud-specked Pacific. Behind the skipper, the flight engineer must keep his eyes glued to a panel containing 211 different gauges, instruments, meters, switches and levers which measure and control the many pulses of the ship. If anything goes wrong, tiny white lights flash warnings. The radio operator maintains constant touch with various stations along the way, making hourly CW checks on position, which are relayed to the big control board at Fairfield. At the loran scope, the navigator takes fixes almost every step of the way, checking the scope's accuracy occasionally by climbing

on a stool and shooting a celestial fix through the astrodome.

Though no MATS planes on the Pacific run have ditched, the subject is always good for conversation when there are sev-

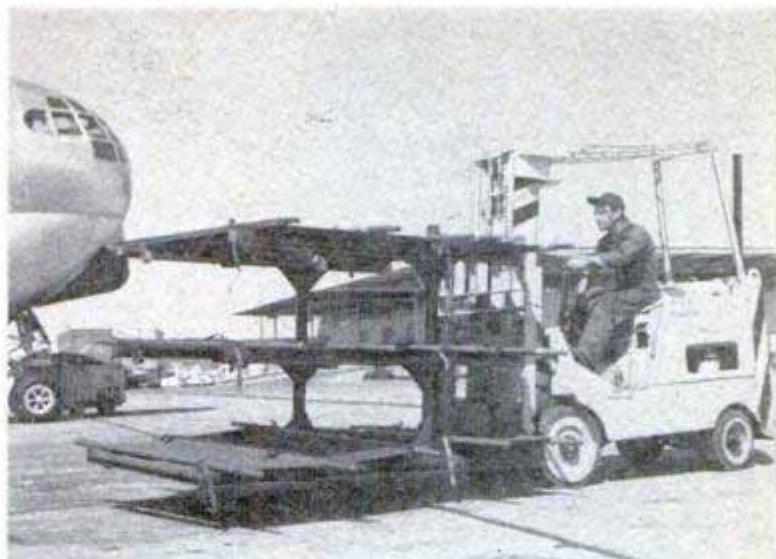
Specially trained men being rushed to battle front sit on litters on lower deck of big plane. The top deck is loaded with high-priority military freight



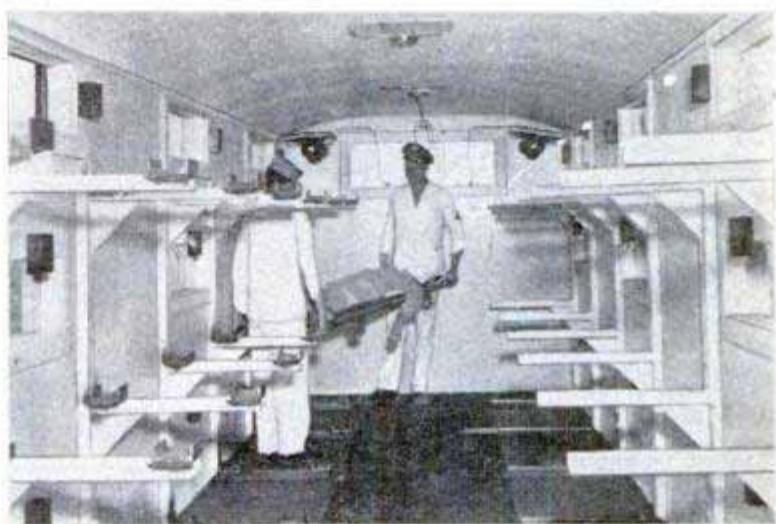
eral thousand miles of ocean still ahead. Capt. Leon Musgrove, skipper on this flight out, and an old hand with hundreds of hours of Berlin airlift time, hasn't had to ditch a plane yet. "Had a close call recently, though," he recalls. "Halfway between Fairfield and Hickam we got a real headwind that sopped up our gas. I came in over Honolulu with 35 gallons in the reserve tank—not even enough to turn the pattern. The tower brought me right in. It was touch and go for a minute. Another pilot (not MATS) dunked in the ocean 80 miles out. Luckily it was just cargo. The crew hit the rafts and Air Rescue got 'em all."

It takes plenty to drop a big "97." She'll keep flying a normal load on two engines. One came into Hickam recently with both dead engines on the same side—the worst combination short of complete failure, since the plane tries to pull away. But the big freighter, with a full load of wounded, limped in without a mishap.

What happens when an airlift plane hits the drink? Our radio operator, who obviously had given it plenty of thought, explained it simply: "Say we lose three engines between Tokyo and Midway coming back with a load of patients. Out on various island bases Air Sea Rescue maintains big Grumman SA-16 amphibs. Radio operators at those bases are constantly

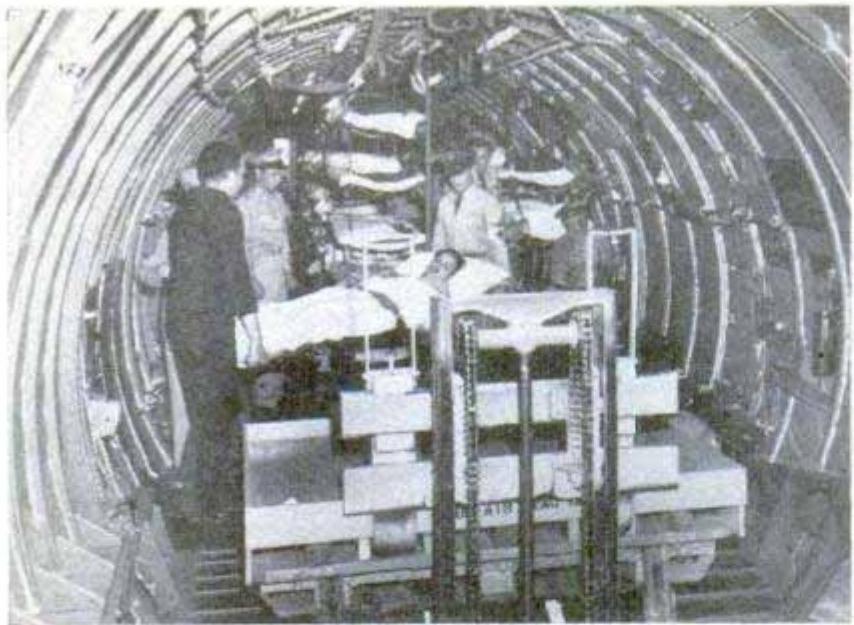


Nine-man litter rack rides a fork lift out across the apron to unload wounded from C-74. Rack will go on the plane's elevator



Inside 30-man ambulance steel brackets project from trailer walls to receive litters at Fairfield-Suisun. The wounded are rushed (below) from the field to hospital soon after arrival





On top deck of C-97 litter bearers quickly remove wounded from fork lift which loads patients through the large hatch under the tail



Rigged for troops, 60-foot upper deck of C-97 will carry 134 men. Below, busy flight nurse moves up and down aisles between litters



monitoring our frequencies. The minute the skipper tells me we're going down, I alert Tokyo, Midway, Guam, Kwajalein, Johnston and Shemya. Each one gets our position, which the navigator reads for me off the loran scope. Before we hit the water, those SA-16s may be taking off to look for us. If there's no time to send an SOS, they'll be out, anyway, since they're automatically alerted if my hourly position report doesn't come in after 90 minutes."

Though no one has proven it, and no MATS pilot is eager to be the first to find out, Boeing engineers claim the C-97 will float indefinitely if ditched fairly smoothly on a reasonably calm sea.

"It should work," Captain Musgrove says. "The plane is pressurized throughout. Hence, she's airtight — and watertight. If we ditched with freight, we'd simply open the bay in the rear, loosen the cargo stays, nose her up and slide the whole load into the ocean in a split second. Then we'd button up and glide in. If we had patients, we'd probably put 'em on rafts at first while we looked over the ship for leaks. If she was tight, we could climb back in and stay with her. The plane would offer better protection and more comfort than the rafts."

Pressurization is what makes the "97" ideal for the job of hauling wounded. The plane can fly at altitudes up to 30,000 feet, save fuel and provide a more comfortable ride, due to lack of turbulence up there. Almost any kind of case can be carried.

Unpressurized planes carrying men with head, abdominal or chest wounds must hug the low-hanging clouds and ride the bumps. High altitude will form gas in the air cavities of these patients and cause complications. It's also tough on sinus, asthma and heart cases.

The speed with which the big airlift planes are converted from stripped-down cargo

(Continued to page 234)



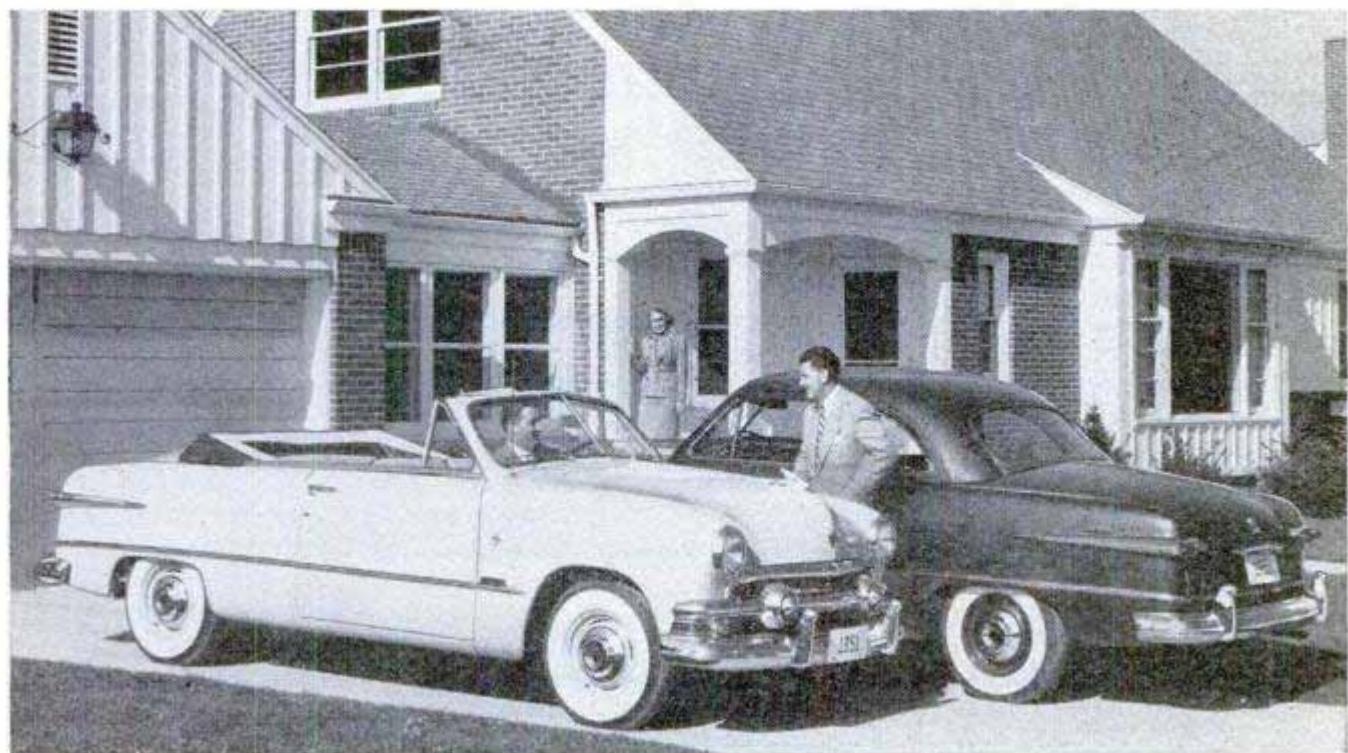
Most obvious change in the new Ford styling is in the grille where there are two "spinners" instead of one

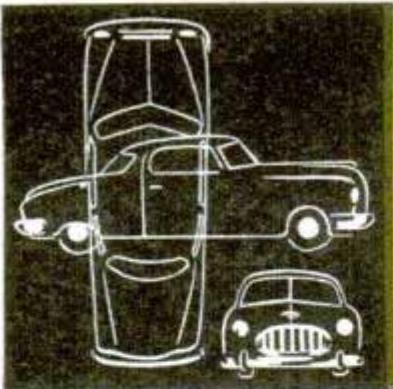
'51 Ford Gets Automatic Transmission

FORD is featuring its Fordomatic automatic transmission on the 1951 models. The same transmission is used on the new Mercury. It multiplies the torque generated by the engine in varying degrees and applies it to the rear wheels. The torque converter is combined with gears which provide three forward speeds and one reverse. It starts in intermediate gear and moves into high between 17 and 65, depending on

how much pressure the gas pedal is given. The hood is now somewhat lower and the grille is referred to as "dual spinner." The wrap-around bumpers are wider and reach farther around the car. On the interior, the instrument panel has been restyled and key starting is provided by a new ignition switch. Suspension improvements and adjustable control valves on the shock absorbers give a "softer" ride.

Added fender protection is provided on the 1951 models by bumpers that wrap around more in front and rear





Detroit Listening Post

By Siler Freeman

THE AUTO INDUSTRY will complete its introduction of new car models this month but it will be in an atmosphere of uncertainty as to how many it will build. Constant government restrictions on critical materials and an accelerated influx of defense orders makes planning and scheduling a difficult task even for the versatile gentlemen who guide the destinies of the automobile companies.

The record year just closed holds no solace and gives no clue to what is ahead. It was a freak year, starting off at low ebb and finishing almost on the same level. In between, however, the automobile plants turned out an unprecedented and unexpected number of cars and trucks and sold them, up to the final quarter, almost as fast as they were produced.

Dealers are starting the new year with a higher inventory than at any time since 1940. For the first time since resumption of production in July 1945, they have had a problem of clearing out stocks to make room for the new models. It wasn't that customers weren't as eager to buy as they have been in past years at this time, but credit controls cut down the number who were able to come up with the high monthly payments necessary.

This is traditionally the low spot in the automobile sales year. Dealers, with new and shiny models to show the customers, mark time for the spring when the buying urge ordinarily returns with vigor. They are somewhat doubtful if the revival will be as strong this year as in the past but a lot depends on what the manufacturers finally decide will be their production level and what the world situation is in March. Another war scare will send customers scrambling like last July and any indication that this year's output will be materially limited will make the dealers sorry they had any doubts about future business.

(As we go to press a National Production Authority official warns that rationing of automobiles and other consumer durable goods may be expected by July 1.)

Early buyers of 1951 models will probably get a much brighter looking car than those who purchase later. The feeling

within the industry is that the shiny chrome trim is due for curtailment before very long. The new models are starting out in all their brilliant silvery glory but nickel will not last long at the rate it is being stockpiled and used up. Bumpers and grilles, of course, will be the last to lose their shine but other parts are expected to suffer blackouts in another month or so.

Meanwhile defense work is gaining in volume throughout the auto industry. It is expected to be big business here before the second half of the year dawns. Tool and die shops are being tied up more and more, and the auto plants have competition for their place on the schedules to get their 1952 work out.

The Ford Motor Company has been quite prominent in setting up its executive staff for defense work. R. E. Krafve has been assigned the task of planning and coordinating what looks like an extensive program, headed by the aviation contract in Chicago. From the extent of the administrative set-up, Ford expects to take a big part in the nation's preparedness.

The uncertainty of the outlook is not interfering with the progress on models for next year and the year after. Development of new engines and transmissions is being carried along but when the new devices will go into the cars for general use cannot be forecast. They are in the works and will be well tested by the time they are allowed to go on the market.

The shift in Chrysler's leadership is being watched by the industry. L. L. Colbert is the new president of the corporation, succeeding K. T. Keller, who was made chairman of the board. Keller has been appointed director of the Armed Forces' guided-missiles program. Another newcomer to the top automotive ranks is Roy Spencer, who replaces Col. J. G. Vincent, venerable executive vice-president of Packard, this month. Spencer comes with an impressive sales record from the West Coast where he was the chief executive for the varied Anthony enterprises. Packard, with a fine-looking and well-engineered new model, is out to regain its former eminent position in the industry.

160-Hp. Muntz Jet

Priced in the luxury sport-car range, a five-passenger convertible coupe called the Muntz Jet is being readied for production by Earl (Madman) Muntz, television manufacturer. Powered by a Cadillac 160-horsepower engine, the Jet will have Hydramatic drive. Muntz hopes to build the first 50 cars in Los Angeles and later to produce them in quantity in Chicago. The car is expected to sell for about \$5000.



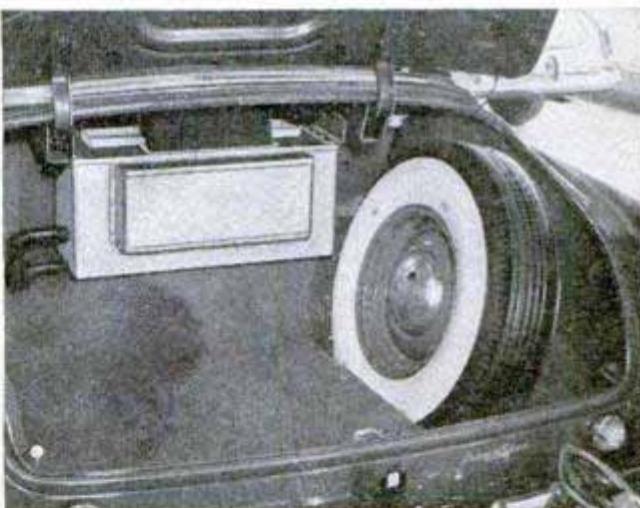
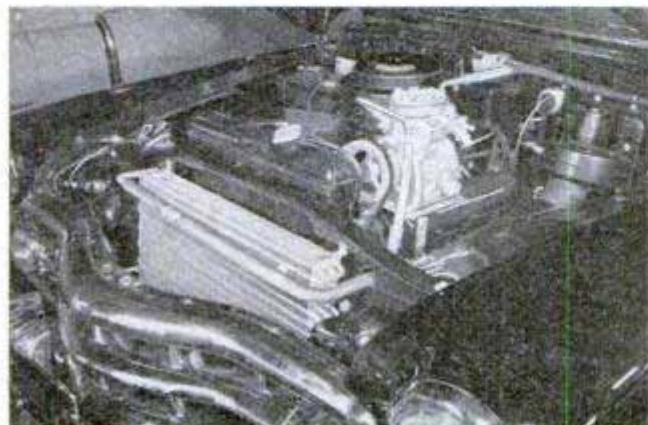
Dual-Purpose FarmOroad

Crosley Motors' FarmOroad is designed to pull a plow or for a quick trip to town. It weighs only 1100 pounds, has a 26.5-horsepower engine and a wheelbase of 63 inches. The car is available with power take-off and hydraulic lift on front, rear, or both dual rear wheels for heavy pulling, and a complete line of implements including plow, disk-harrow, cultivator, mower and hydraulic-powered dump body. There are six forward speeds and two reverse.

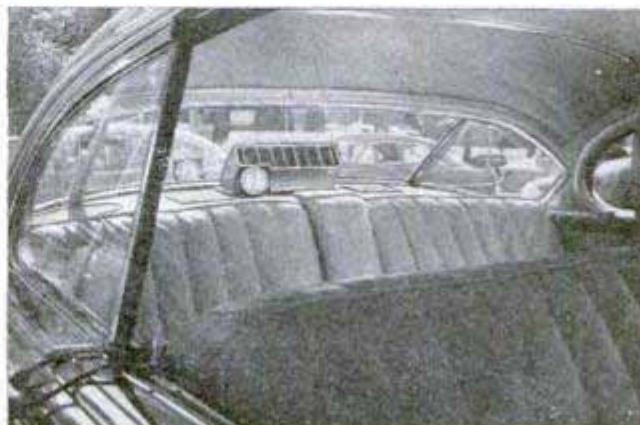
Compressor Air-Conditioning Auto In Seven Minutes

Cool, comfortable driving is assured even when crossing the desert with an air-conditioning unit for passenger cars. It cools and dehumidifies the air, lowering inside temperature as much as 28 degrees in 7 minutes. An evaporator in the trunk removes warm air from the car interior, replacing it with cooled air through a grille behind the rear seat. A compressor is installed under the hood and the condensing coil is mounted between the radiator and grille. Car windows are kept closed when the unit is in operation.

Mounted above the engine is the compressor, driven by V-belt. Condensing coil is in front of radiator



Evaporating unit in trunk, above, cools air as it's forced into car through a grille behind seat, below



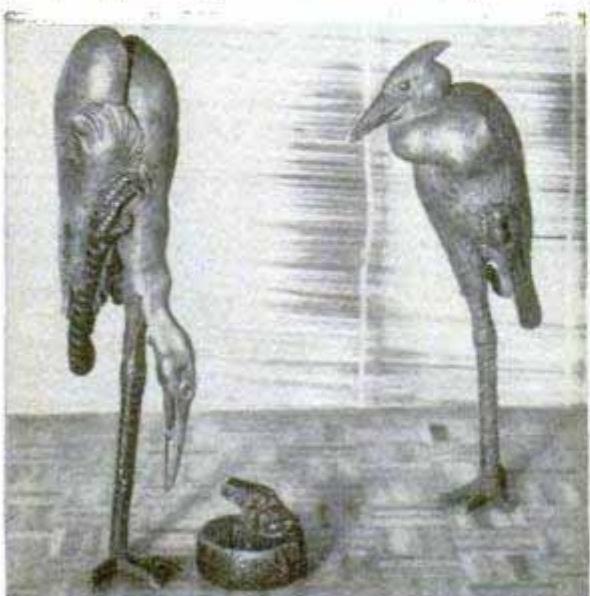
Here's a former Army engineer who came home from the Philippines and Japan to become a . . .

SPECIALIST in BAMBOO

Below, Bonnie Lutz "shoots" a toy bamboo machine gun which pops noisily. Her chair is bamboo, too



These storks were carved from a bamboo rootstock as was the frog. The figures are standing on a piece of parquet paneling, also bamboo. Right, brushes, vases and other items, even the flower at rear, are bamboo



Violin and bow that Lutz is holding are both bamboo

WHEN Walter E. Lutz came back to the States after Army service in the Orient, he brought with him a wealth of knowledge about bamboo. Today, that knowledge makes Bamboo House in Lakewood, Ohio, one of the nation's most interesting small businesses.

In the museum at Bamboo House, Lutz exhibits scores of articles made from bamboo. Some, which he brought back from





Bamboo is widely used in basketry. Mrs. Lutz holds a modern style. The one at left is about 200 years old

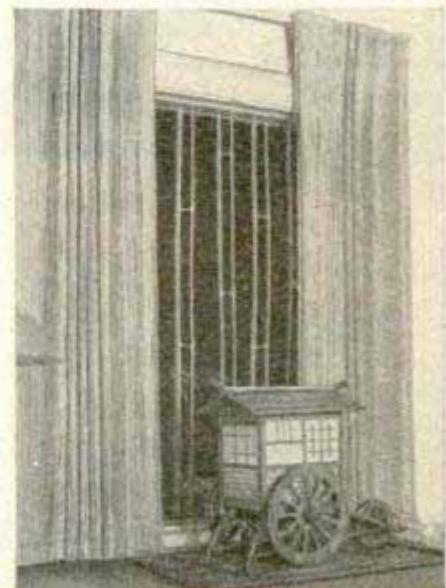
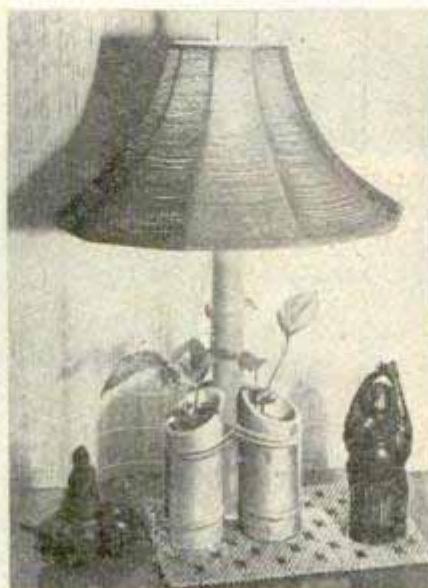
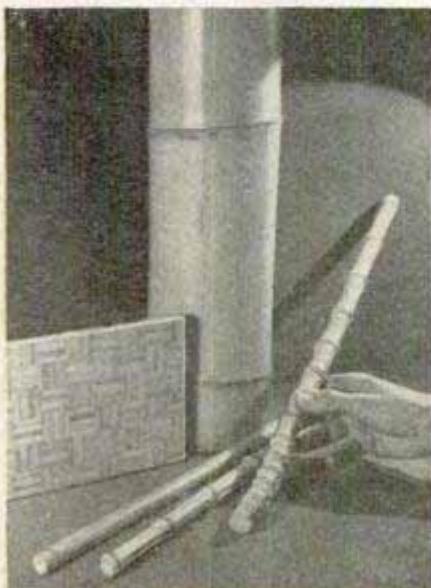
overseas, are hundreds of years old. Others, built in his basement workshop, are as modern as the electric lamp.

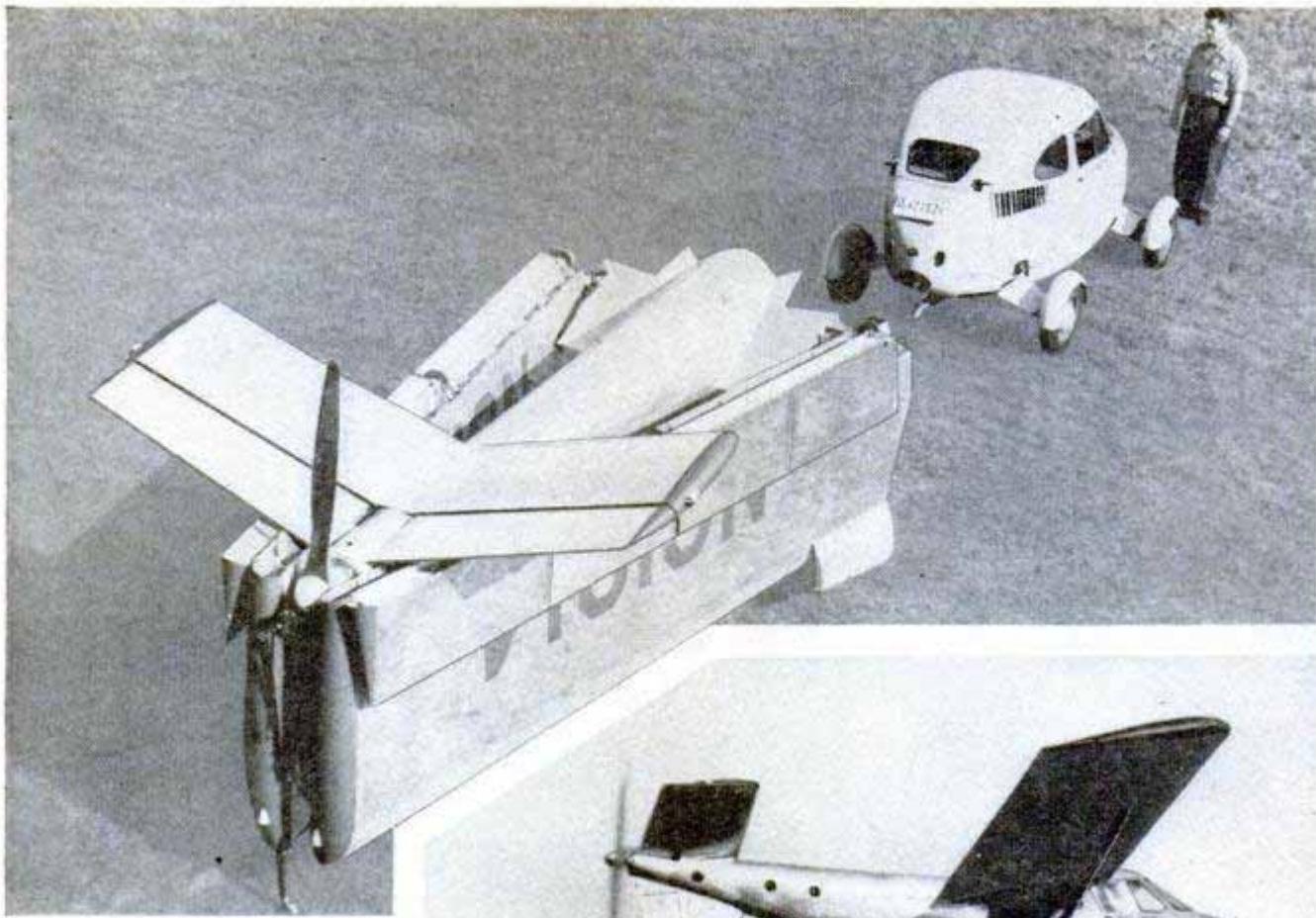
Bamboo is actually a member of the grass family and some of its 1000 varieties grow to heights of 120 feet with stems 16 inches in diameter. The above-ground portion of the bamboo plant is most familiar to Americans, being a favorite for fishing poles. The underground rootstock, the

rhizome, is solid all the way through and makes excellent knife handles, canes, buttons and other articles. Being very dense, the rootstock is used for carving figurines. It takes a high polish.

Two of the most unusual uses Lutz makes of bamboo are bamboo plywood and a parquet paneling consisting of hundreds of pieces glued together in checkerboard fashion.

Below, left, some examples of bamboo. Piece being held is rootstock. Flat piece is parquet paneling. Center, lamps are a popular use for bamboo. Right, just about everything here is bamboo, including the window grille





It takes one minute to detach car from tail and wing section, which is towed like a trailer. Flying version has a cruising speed of over 100 miles an hour

Quick-Change Flying Auto

No tools or special equipment are needed to convert a newly designed flying automobile back to road use. The change-over can be made by one person in a few minutes. Small enough to be kept in a home garage, the flying vehicle has a front-wheel auto drive and a pressure air-cooled rear engine. It is equipped for crosswind landings and is said to be spinproof.



Liquid Nitrogen Pulverizes Tough Materials

Even extremely tough and hard materials can be ground to a powder through a new process which utilizes the cooling properties of liquid nitrogen. In the past, some tough materials were difficult to grind because they became overheated. Now, the material to be ground is first sprayed with liquid nitrogen, which cools it to an extremely low temperature where

the material becomes fragile. It then passes through a pulverizing mill. Nitrogen is an inert element and therefore does not react with the materials being pulverized.

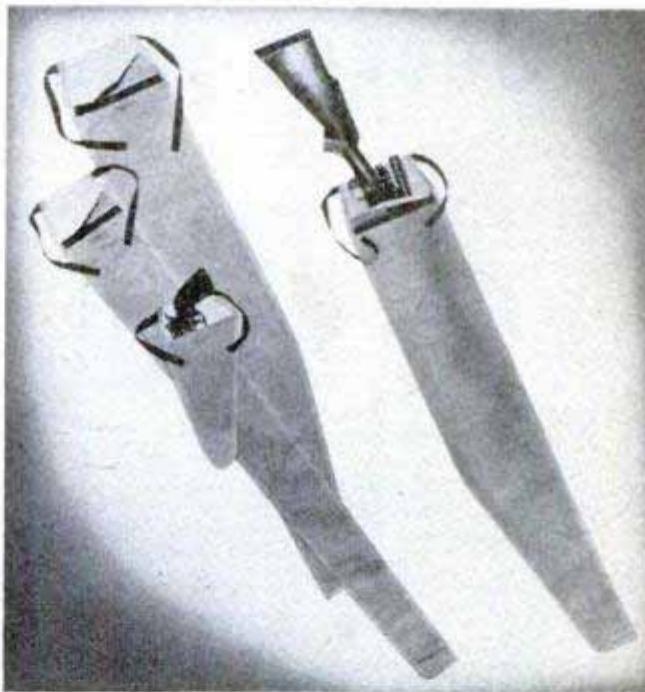
There are approximately 59,300,000 registered automobile drivers in the U. S., according to the Automobile Manufacturers Association.



Record Power-Per-Pound Motors

High performance has finally been put in an easily portable package for outboard motorboat users. Two new 25-horsepower engines, designed by Evinrude and Johnson, weigh only 85 pounds each, 37 pounds

less than the lightest previous unit. They can be carried and positioned on a boat transom by one man. Both are gearshift motors, with alternate-firing twin cylinders and throttle and spark operated by a twist grip on the steering handle. Their speeds range from 2 to 30 miles an hour.



Vapor Paper Prevents Rust

Treated with a chemical which slowly vaporizes, a durable paper protects metal from rust. The vapors released by the chemical actually form an invisible film

over the metal surfaces to protect them from oxidation. Available by the sheet for wrapping tools and instruments, the paper is also made into gun protectors that come in three sizes and can be used alone or as a liner for a standard leather case.

Eggs Stored In Room Containing Ozone Retain Fresh Taste

Frozen eggs, when stored in a room containing ozone, retain a fresh taste for eight months. Ozone is a special form of oxygen. In an egg-storage room, ozone controls mold growth—a problem in such rooms because

a high humidity is necessary to reduce egg shrinkage. Only a small quantity of ozone is required even when humidity is 90 percent, according to Dr. A. W. Ewell, ozone consultant for Westinghouse.

ROBERT W. LOVE of Oxnard, Calif., has perhaps the world's most unique job. He dives 125 feet below the surface of the sea for super-secret guided missiles that U. S. Navy scientists fire into the ocean off Point Mugu.

Although a life insurance man would avoid him, in four years of such strange work, Love has never had an accident or any serious trouble with denizens of the deep—although, he admits, some of them get mighty curious at times.

Thirty-foot whales nose around his air hose . . . big moray eels stand their ground and he avoids them rather than start a fight . . . sometimes he waits until a mean-looking octopus slithers away from a missile before he can hook a cable onto it.

A chief boatswain's mate in the U. S. Navy during World War II, Love is a solidly built man, with the calm, unruffled temperament that all good divers possess.

The Navy established its Air Missile Test

Center at Point Mugu, about 100 miles north of Los Angeles. His contract with the Navy is worth every penny it costs the taxpayers. Last year the monetary value alone of missiles Love recovered was more than \$35,000. But, if they hadn't been retrieved quickly, their loss would have slowed down the whole guided-missile research program and delay might have run into millions.

Love does his diving from a 30-foot cabin cruiser, the Chota-Peg, which has a special winch for lifting missiles out of the water. Since much of the firing is done early, before the wind comes up, Love usually starts to work at about 6 a.m. He stores his diving gear into a car, picks up his assistant, Frank De Pue, a former maritime service skipper, and boards the Chota-Peg. Forty minutes later he's "on station," waiting for the firing to begin.

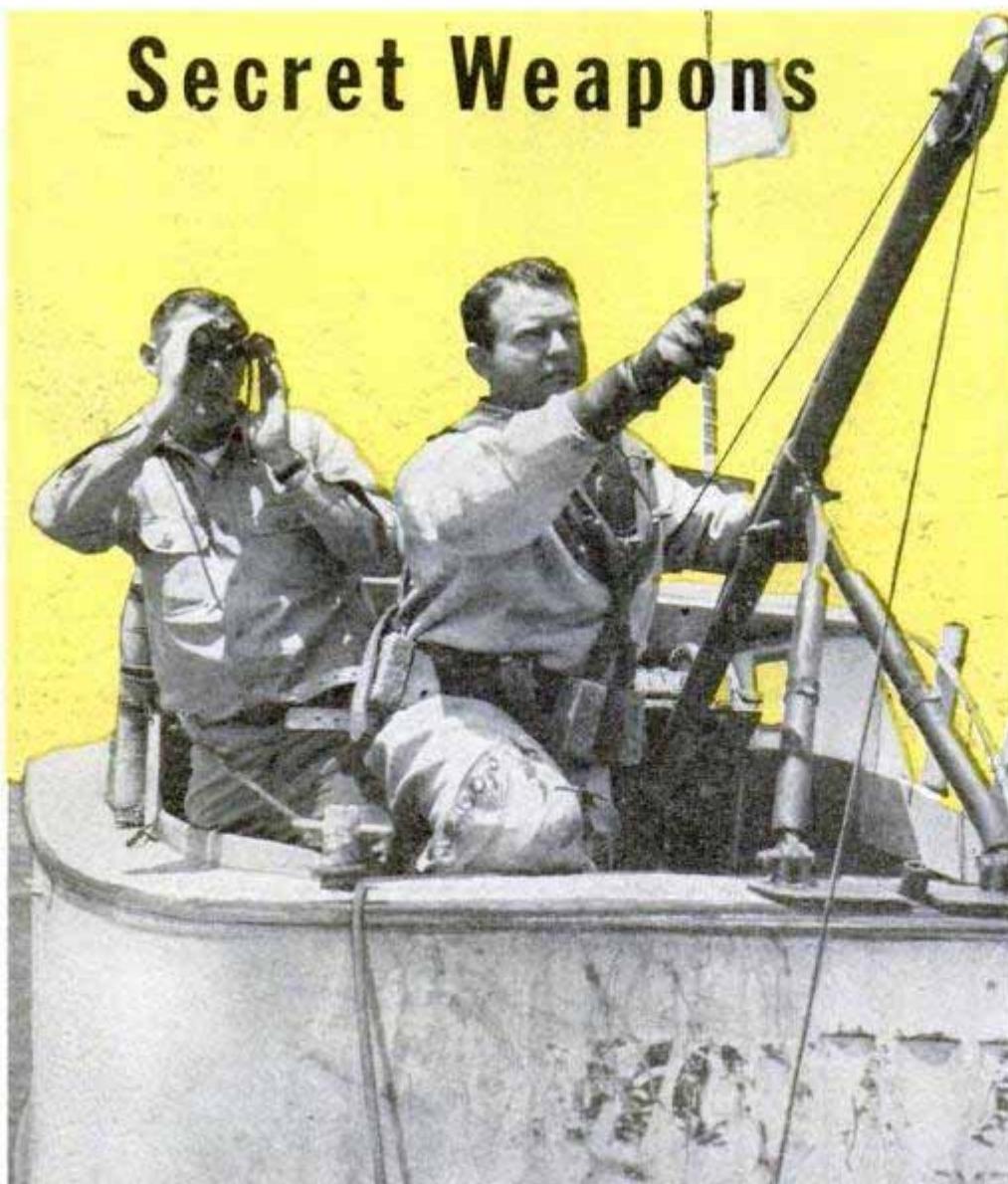
Most of the test missiles are deliberately fired short so that they can be quickly recovered. Maximum depth in which he can

He Fishes For

Secret Weapons

By

Andrew Hamilton



Spotting a missile just as it plunges into the ocean, diver Bob Love, right, and Frank De Pue will speed their boat to area near the splash

Recovered missiles are hoisted from water by a special winch mounted aft. A 30-foot cruiser, the Chota-Peg, is the operating platform for search assignments



work efficiently is about 125 feet. When a "bird" is fired, Love and De Pue mark the spot with powerful binoculars and put the Chota-Peg near where it splashed. Then Love, moving slowly under the weight of his 190-pound suit, goes over the side.

From below he talks to De Pue:

"Frank . . . I can't see a thing . . . the bottom sand is churned up. Better hoist me about 10 feet off the bottom . . ."

De Pue eases the Chota-Peg's winch back a little. Then Love speaks again:

"I can see better now . . . wait a minute . . . yep—that she blows! It's a bat and not damaged much . . ."

He fastens a cable to the bright-red, 500-pound missile and the winch hoists it out of the water.

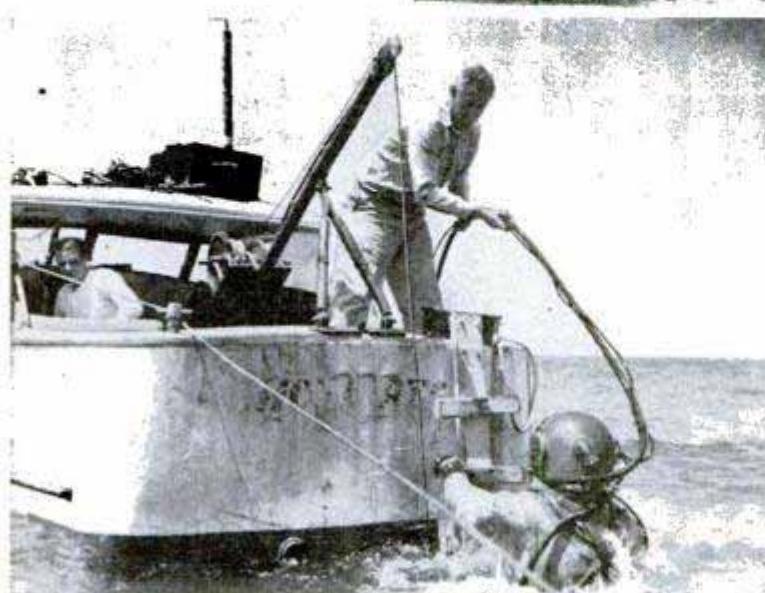
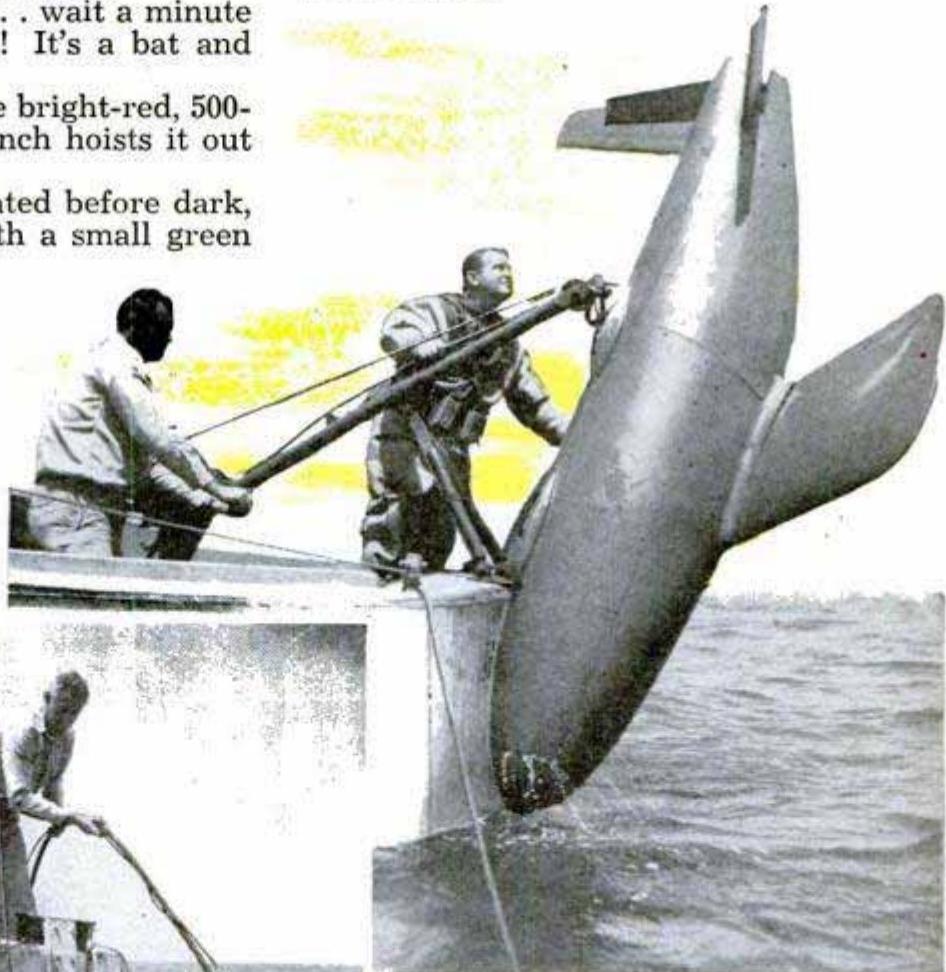
If a "bird" can't be located before dark, its position is marked with a small green

buoy and a red flag. The diving team can return later and resume the search.

While Love and De Pue are waiting for the missiles to go over, they spend a lot of time jig-fishing for halibut. An average week will see three guided missiles recovered and about 30 fish taken.

"Bob always has an advantage over me," says De Pue. "He can take a spear below with him and pick out the biggest halibut on the bottom. Last week he hauled in a 31-pounder!"

Up from the ocean floor comes a bright-red, 500-pound bat. The monetary value alone for missiles recovered during one year was in excess of \$35,000



With De Pue manning the air hose, Love goes down on a search. Though he has never had serious trouble with them, bulky moray eels and 30-foot whales have given him anxious moments when they've found him prowling in their underwater preserve. The deepest at which he can work efficiently is 125 feet



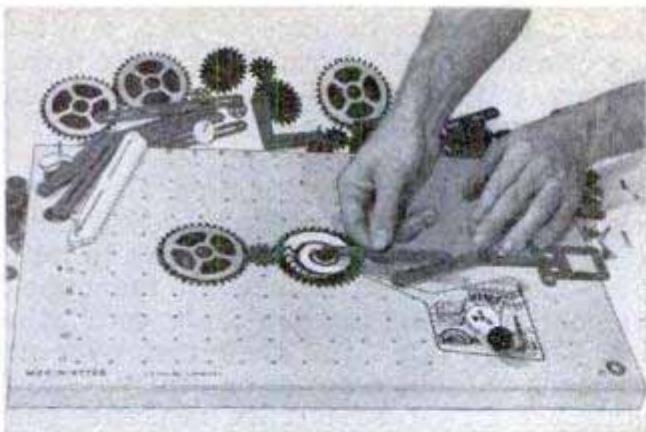
"Skates" and Yachts for Sailor Tots

ONE DAY Ed Burns' small daughter asked him for something that would help her "walk on water." Instead of laughing it off, Burns went to the basement of his Long Island Sound home and came out with a pair of five-foot pontoons with wells in the top for his daughter's feet. She soon learned to "skate" over the water, and Burns has been busy ever since turning out a raft of "yachts for tots." Included in the fleet are a catamaran and a real 5½-foot boat, which has a 2½-foot beam, weighs 50 pounds and is built of ¼-inch plywood.

Right, tiny tot paddles single "skate." Below, 5½-foot hull can be rigged in many ways. Other end of tether is held by mother on shore

Above, left, two water "skates" lashed together, plus a sail, make a catamaran for tiny seamen. Above, girl scuds along on a pair of "skates" as the wind catches the umbrella she holds





Mechanical Toy Kit For Future Engineers

High-school students can practice the mechanical principles they study in physics classes on a new educational toy. The toy, which is also a valuable training aid for teachers, consists of many wheels, gears, levers and other machine parts that are assembled on a perforated board to form operating models. Anything from a single-cylinder engine to a complex gear train can be set up on the board. A hand crank transmits power to a center gear for driving the mechanisms.

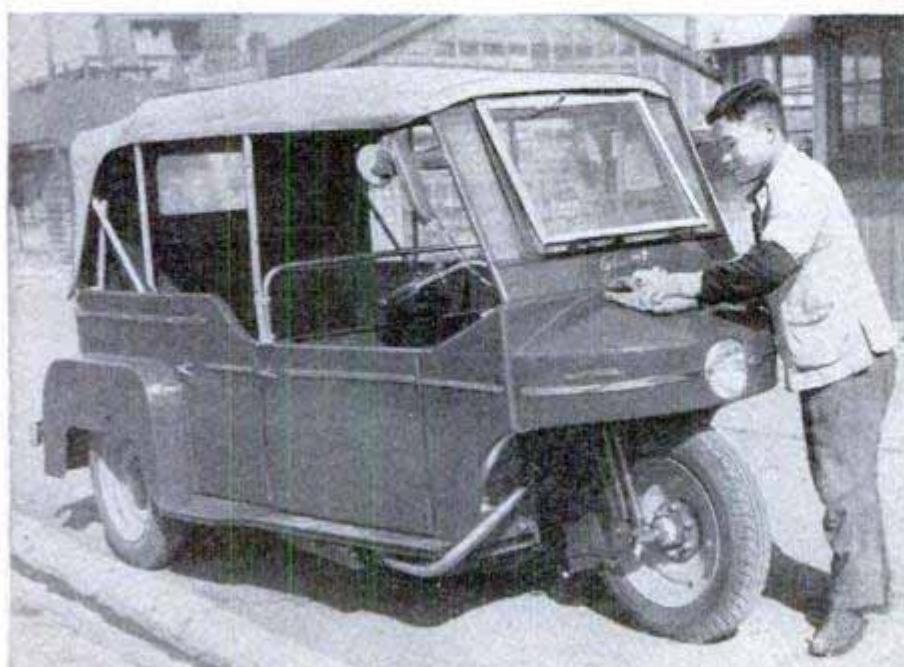
U. S.—Leader in Trucks and Busses

Although the United States has only about six percent of the world's population, it operates 51.6 percent of the world's trucks and busses. There are more than 8,000,000 trucks in the United States today. About 27 percent are owned by farmers and 56 percent by dairies, bakeries and other establishments which carry their goods in their own vehicles. Trucks for hire number 1,000,000, and 10 percent of these are operated by the railways.



Portable Electric Saw Cuts Concrete and Asphalt

Twelve feet of asphalt or five feet of concrete—one inch deep—can be cut a minute by a new portable electric saw. Used on concrete floors, streets or airport runways, the saw provides straight smooth edges along which the materials can be broken. It has a maximum cutting depth of 6½ inches through limestone, flint or granite-aggregate concretes. Floating three-point suspension prevents the blade from binding as it moves over rough surfaces. The larger of two models is run by a 13-horsepower, two-cylinder gasoline engine.



Tokyo Motorcycle Carries Six

Built atop a three-wheel motorcycle chassis, a new Japanese motor vehicle is roomy enough to carry six passengers, including the driver. Three persons sit on the rear seat and two more on folding seats facing toward the rear. The driver sits in a separate compartment in the front. The vehicle sells for about \$780 in Tokyo.

One out of every five cars in use has been driven more than 80,000 miles.



Riding around in his Jeep, the referee announces his decisions with signal lights

POLO ON FOUR WHEELS

TAKE a generous helping of polo, a little soccer and a dash of pushball, shake them vigorously with stripped-down automobiles and you've got Moto Polo—the newest California sports craze.

Protected by a heavy steel bumper that completely encircles the car and a sturdy framework of steel piping, each driver tries to butt the five-foot rubber ball through the opponent's goal, using his mechanical "steed" as a mallet. Drivers often roll their cars over at high speeds without damage or injury. They are strapped in the seats with airplane-type web belts and wear crash helmets, just in case.

When smacked by a speeding car, the 200-pound rubber ball sometimes bounces 100 feet or more down the field. It often pops 50 feet straight upward when hit by two cars.

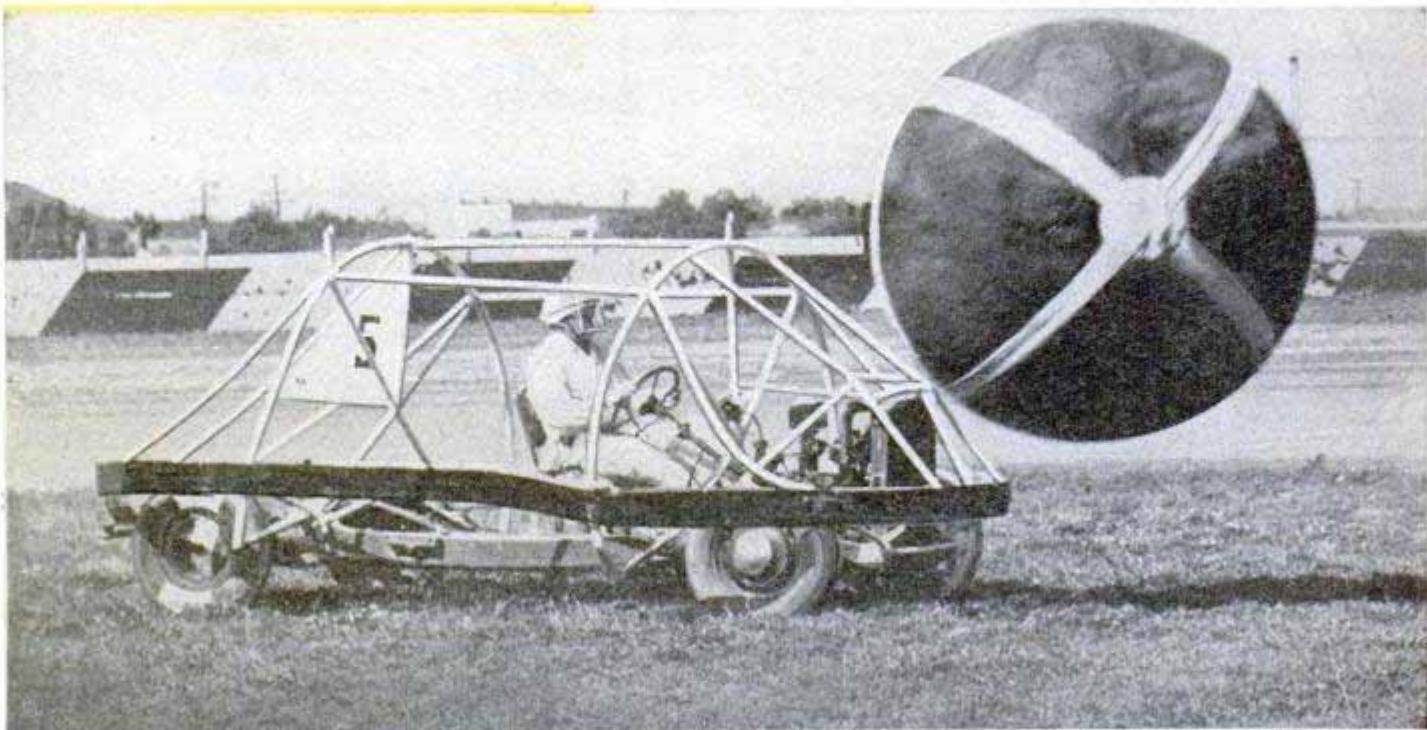
The game is played on a regulation football field or in the infield of an automobile race track. There are only three players on each team and one of them serves as goalie. Four 20-minute quarters are played. The cars are Fords, vintage 1935 and 1936, stripped down to the chassis.

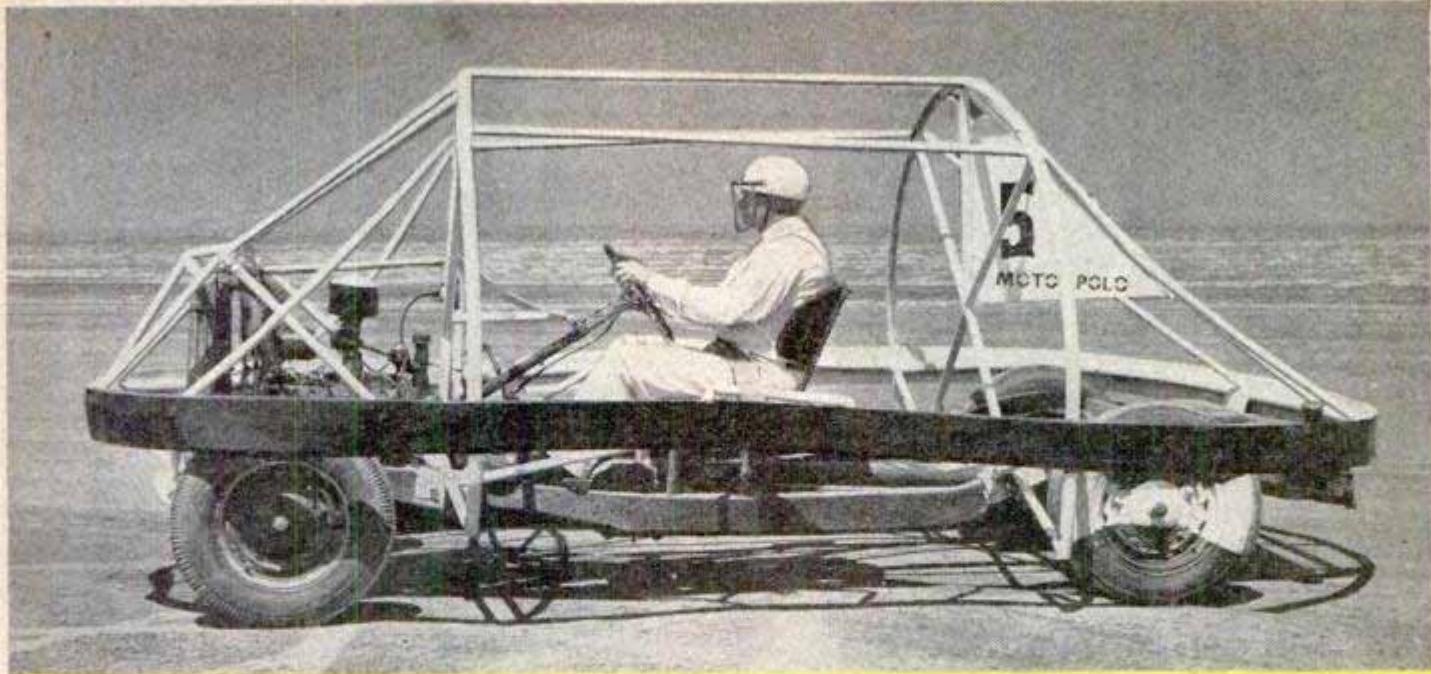
The referee rides around in a Jeep (also equipped with steel hoops) dodging in and out as he watches for fouls. He calls decisions with colored lights during night games. In daytime games, he fires blank cartridges.

Two Bakersfield, Calif., brothers, Bill and B. J. Goodman, invented the new sport. They build Moto Polo cars in the garage where they run a trucking business.

Moto Polo drivers have to be skillful judges of timing and distances. The cars, although old and worn, must be kept in first-class condition as the outcome of the game depends on quick starting and stopping.

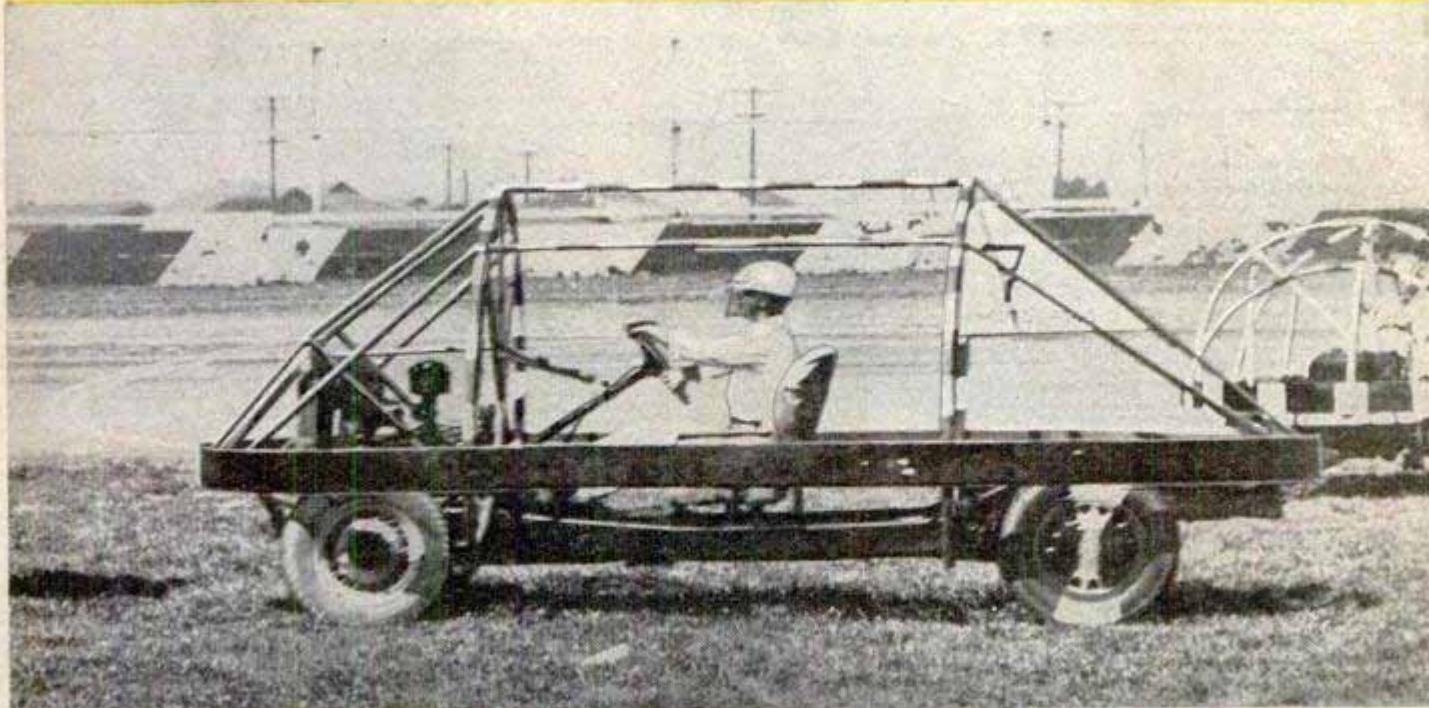
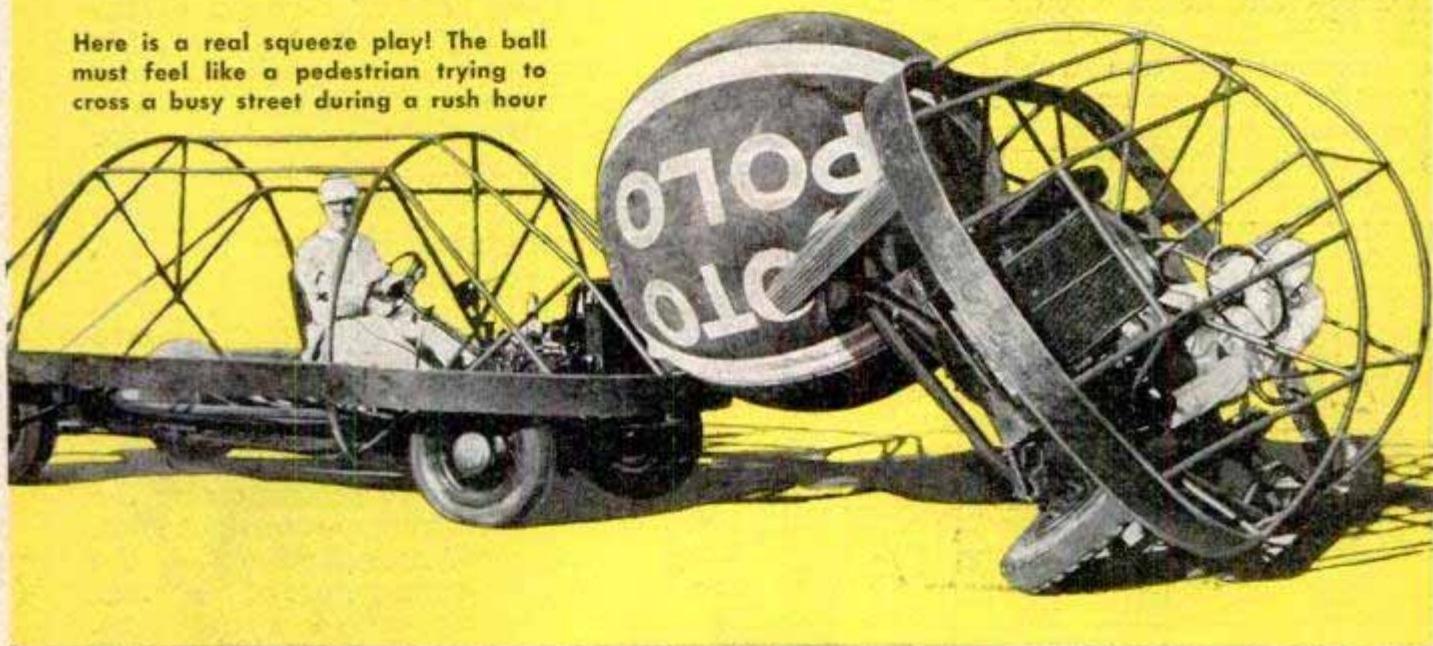
Car 5 bounces the big rubber ball off its "nose" as Car 7 (opposite page) moves into position for an interception

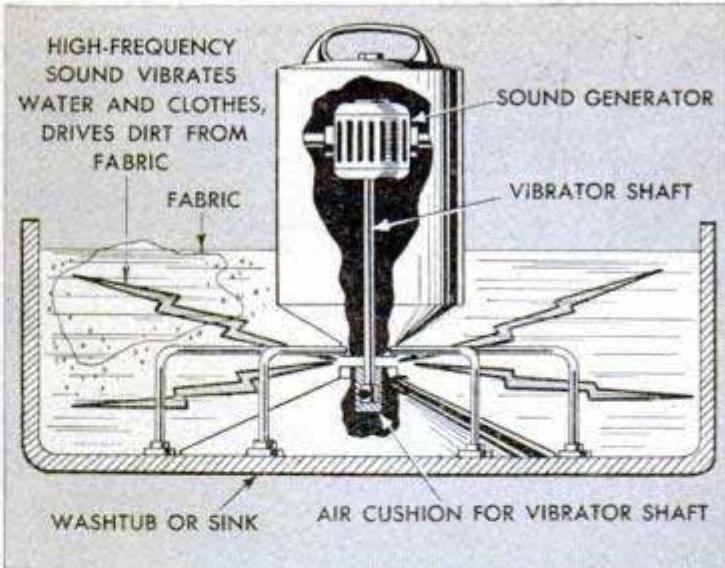




Old Fords, stripped down to the chassis, are the "ponies" of the game. Notice the sturdy steel framework

Here is a real squeeze play! The ball must feel like a pedestrian trying to cross a busy street during a rush hour

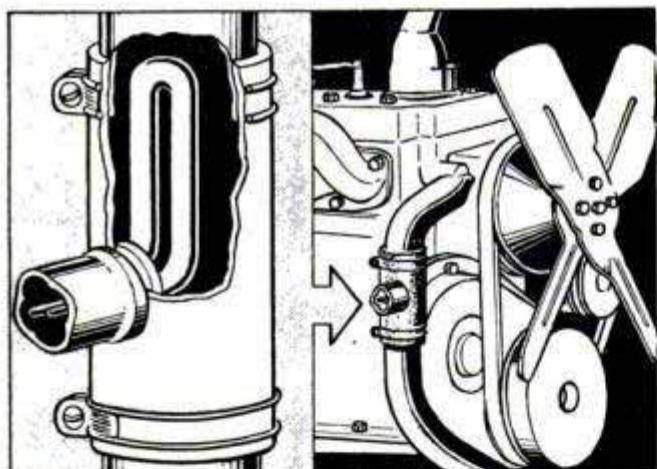




Ultrasonic Washing Machine

Sound waves from a tiny new washing machine charge through a tub of water, literally knocking the spots out of clothes. The ultrasonic washer is about the size of a Thermos jug and weighs only seven pounds, yet it can handle nine pounds of dry wash at a time. The housewife places the machine in the tub, packs the laundry

around it and adds soap and water. A sound generator in the upper section then vibrates a long shaft leading to the base. Oscillating waves pour through the water at a rate of 120 per second, shaking dirt out of the clothes. According to the inventor, the ultrasonic waves will even wash out stains and grease. The housewife can't use it as a dishwasher though—the sound waves for laundry would shatter china to bits.



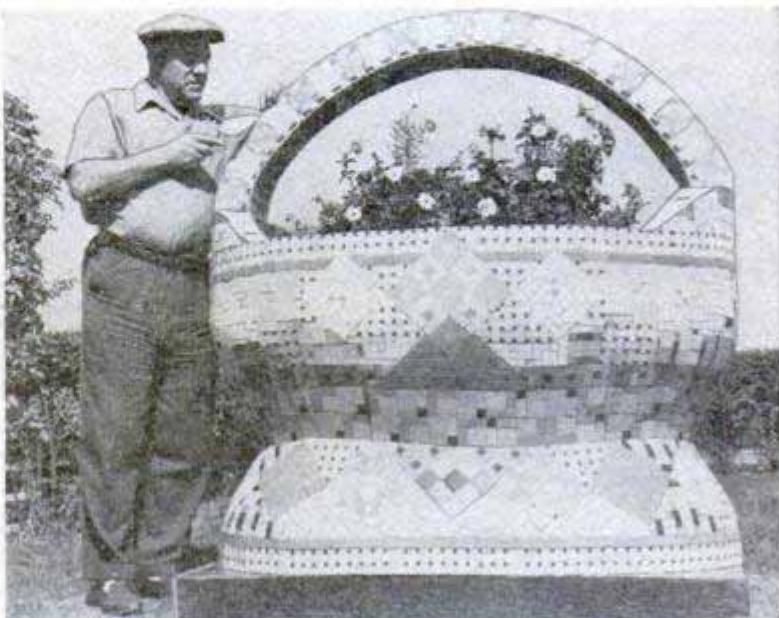
Electric Immersion Heater Prewarms Car Engine

Automobile drivers can laugh at sub-zero weather when they use an electric immersion engine heater. It is installed in the lower radiator hose. Installation is simple. A hole is cut in the hose and the heating element inserted. Two screws clamp the unit to the hose, making a watertight joint. Plugged into any household outlet, the heater brings the temperature of the water up to quick-starting levels in a short time. During sub-zero weather, it can be operated all night, if desired.

Tile Basket

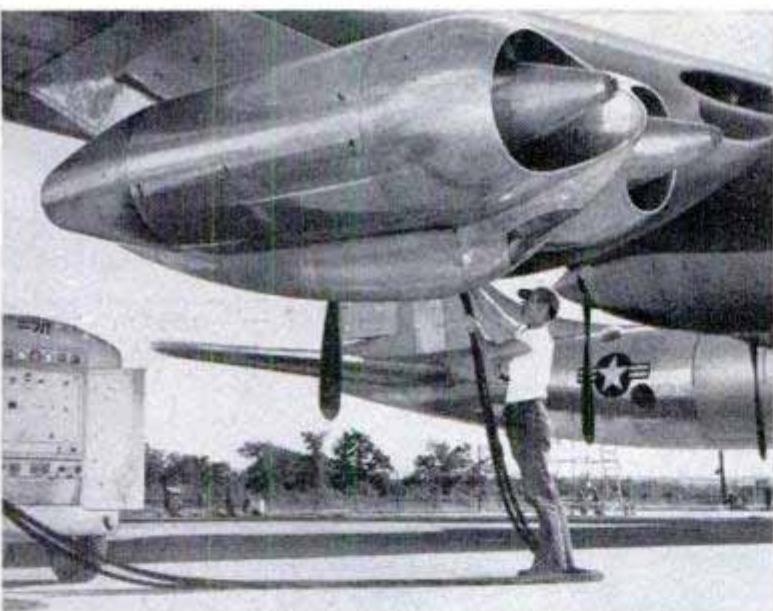
There's a two-ton flower basket decorating the yard of a Chicago home. The basket, made of brick and bathroom tile, is as tall as its owner, Frank Cleys, a school janitor. Cleys spent 250 hours building the basket and covering it with 12,000 pieces of discarded tile, which he purchased from a contractor. Flowers grow in the huge bowl of the basket which is filled with dirt.

ISo tiny they can't be seen, atomic particles called neutrons are so "heavy" that a teaspoonful would weigh 210,000,000 tons!





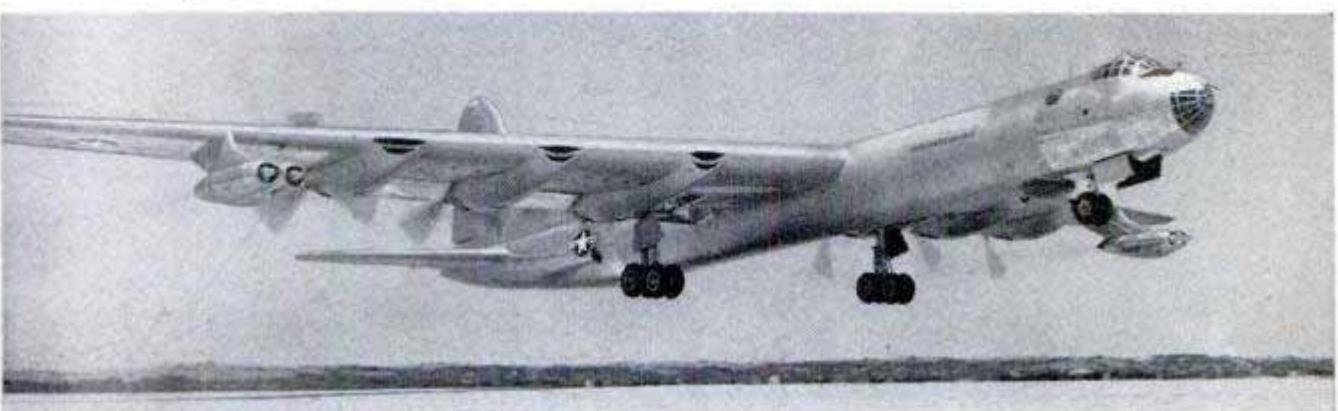
Service tractor for the B-36 can pull 400,000 pounds, move backward, forward and sideways and turn in a radius of 17 feet



Twin jet engines fit in a "pod" beneath each wing. They add 20,000 pounds of thrust to the 21,000 horsepower already developed. Below, jets aid big plane in take-off, increase its speed

JETS FOR OUR B-36

FOUR jet engines are being built into Uncle Sam's B-36 in addition to the six reciprocating engines which already power the giant plane. The jet units are mounted in pairs in a "pod" beneath the outer wing panels. They provide additional power for take-off, improve the rate of climb, raise the ceiling and increase the plane's speed. The Air Force has disclosed that the jet-equipped B-36 has a maximum speed of over 435 miles an hour and a ceiling of over 45,000 feet. The jet engines also are being installed on earlier models of the B-36. For servicing the plane, the Air Materiel Command has developed a huge tractor which can pull 14 times its own weight and can travel forward, backward or sideways.



I'VE MADE many a jump with a parachute strapped to my back, but dropping out of a bomb bay eight miles in the air and falling, strapped in a chair, for more than five miles before the main chute opens—that's something new. You might not like the sensation.

We don't do these things for the thrill. Six of us from the Air Materiel Command volunteered for the job, and we made 14 jumps from as high as the stratosphere. One of my drops, from 42,176 feet, turned out to be the highest altitude from which man has ever jumped.

Our problem was to find out how high-altitude emergency bail-outs could be made with maximum safety. We wanted to know, too, exactly how fast a free-falling body travels when it has plenty of space to get going. And there were other questions that needed answering . . . how to prevent the

sickening spin as you drift down, and what happens if you're blown or forced out of a high-flying pressurized plane by mechanical mishap or enemy action.

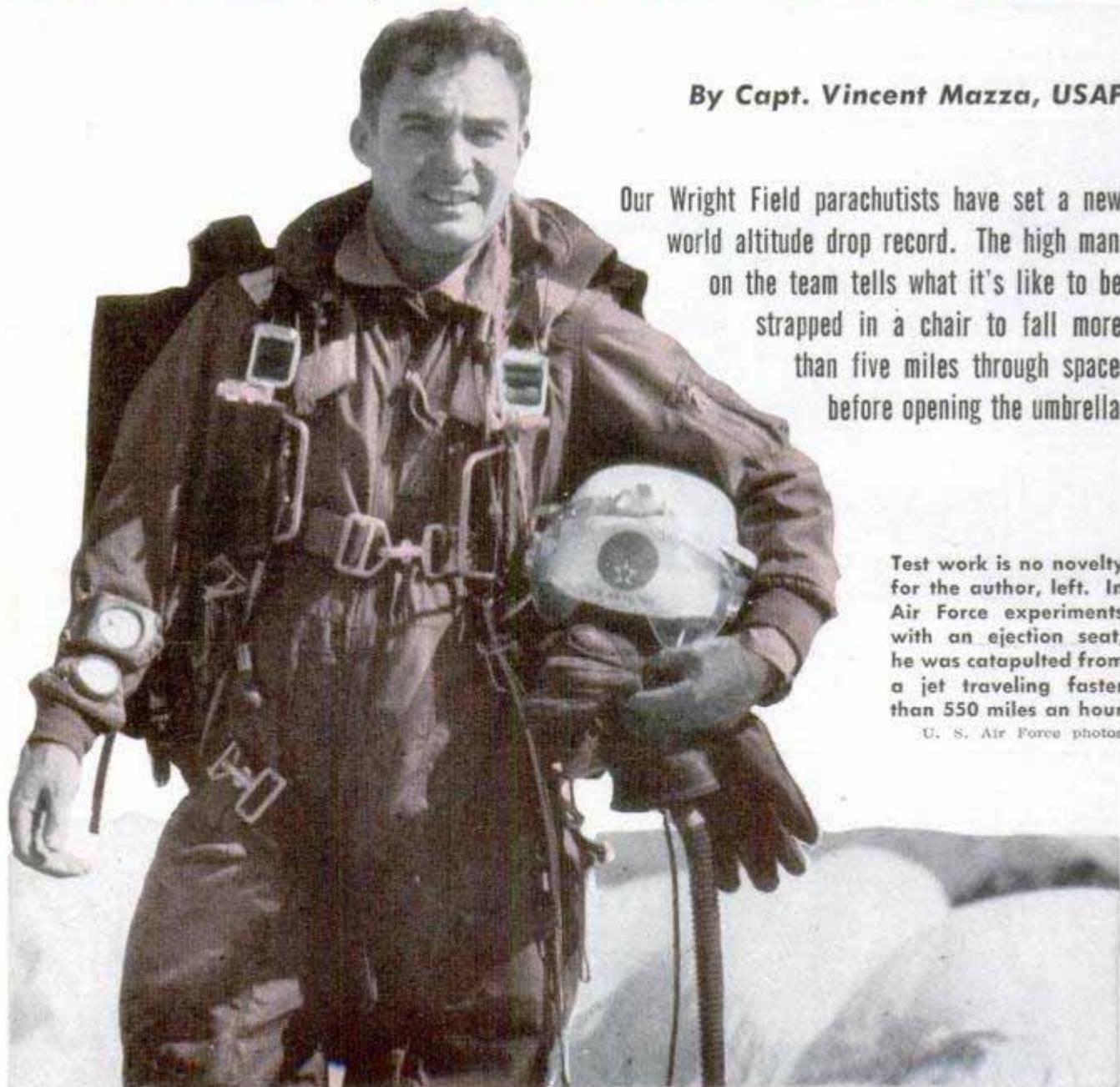
Would it be safer to have the chute open quickly, while you're still conscious, and risk freezing and using up all your bottled oxygen on the slow trip down? On at least two occasions jumpers were rendered unconscious by the jolt of the parachute opening at high altitude. Or is it best to free-fall the first miles and take a chance that you'll be conscious and able to pull the cord at the proper time, and altitude.

If the long, free fall is the better method for emergencies, we'd have to be certain we had a foolproof automatic means to insure the chute's opening, and opening at the proper time. We couldn't be sure that a jumper, perhaps wounded or injured, would be conscious, or that his perceptions

EIGHT-MILE-HIGH JUMP

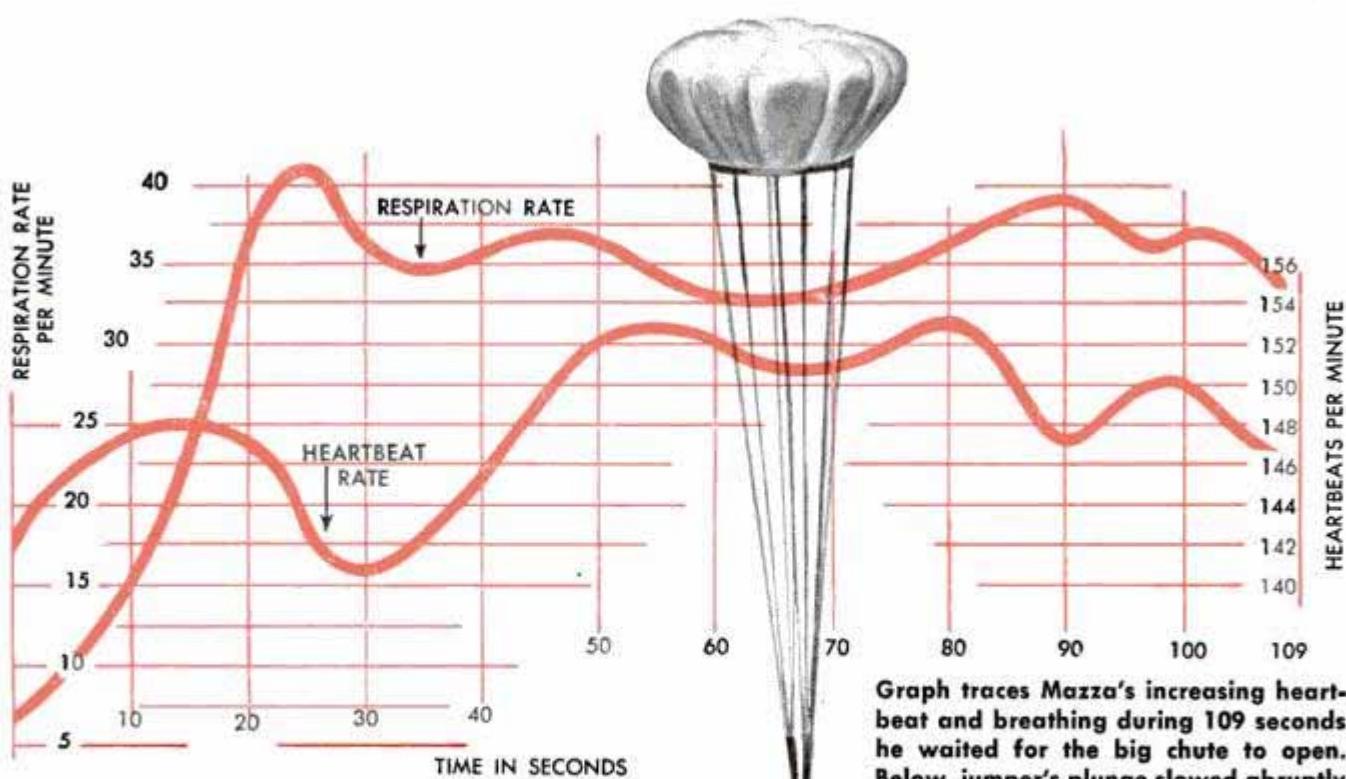
By Capt. Vincent Mazza, USAF

Our Wright Field parachutists have set a new world altitude drop record. The high man on the team tells what it's like to be strapped in a chair to fall more than five miles through space before opening the umbrella



Test work is no novelty for the author, left. In Air Force experiments with an ejection seat, he was catapulted from a jet traveling faster than 550 miles an hour

U. S. Air Force photo



Graph traces Mazza's increasing heart-beat and breathing during 109 seconds he waited for the big chute to open. Below, jumper's plunge slowed abruptly when the canopy opened at 14,600 feet

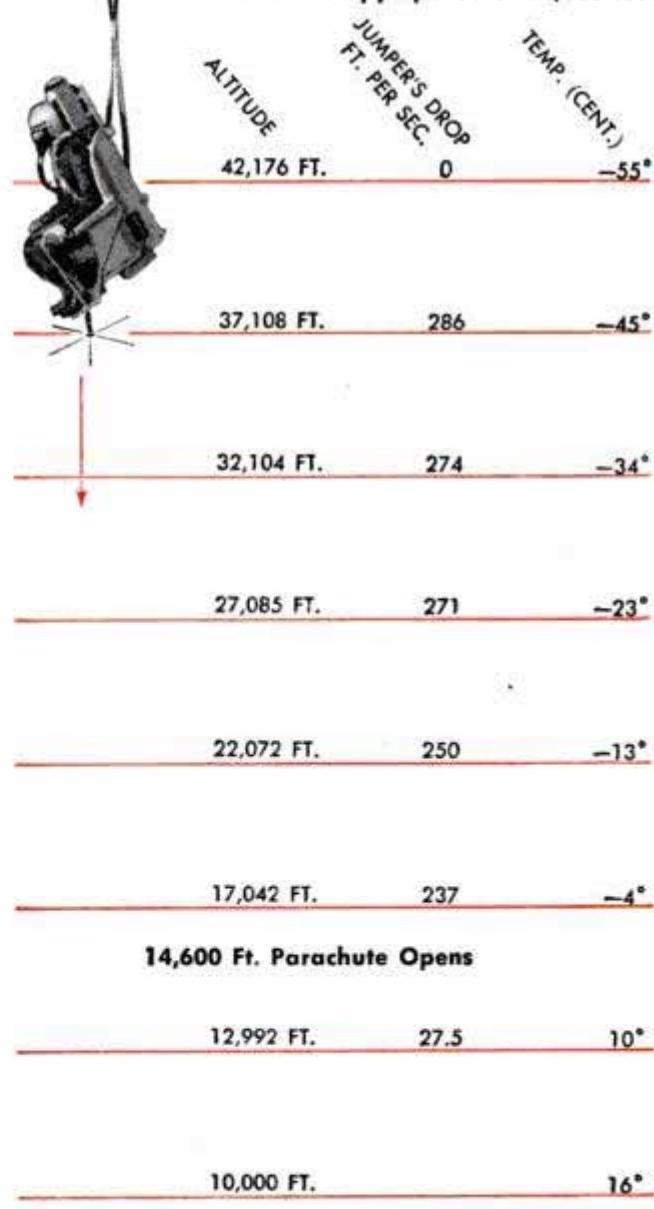
and reactions wouldn't play him tricks, after he'd been hurtling through space at as fast as 250 miles an hour.

Col. M. W. Boynton, in a test jump from 40,000 feet without an automatic parachute-opening device, had plummeted to his death in 1944. Though experienced as a parachutist and in high altitude work, he apparently made no attempt to pull the rip cord. Col. W. R. Lovelace had been knocked unconscious by the chute's opening jolt on a drop from 40,000 feet and lost a glove off his hand, which froze on the way down.

I don't want you to have false illusions about our daring. Our 14 jumps above the desert near the Holloman, N. Mex., Air Force Base were neither a mass assault on the altitude record, nor a field day for thrill seekers. Honestly, if I had thought it was dangerous they couldn't have pushed me out of the plane with a battering ram. But I knew that months of thorough planning and preparation by the Aero-Medical Equipment and Aircraft Laboratories of the Air Materiel Command had cut the risk element to almost nothing.

Our problem wasn't simple. Aircraft and engine designers have boosted flight ceilings to new highs. Pressurization, better superchargers and greater power have shoved our definition of "high altitude" above the 40,000-foot level. That has advantages for both combat and commercial flying, so long as we're able to stay in the airplane, protected from the elements and breathing "made" air.

We had gone as far as we could in the laboratories toward piecing together a solution. There were still many key questions that only actual proof-testing could answer.





Seventy pounds of clothing and equipment were worn by or attached to parachutists. Over their flying togs was a thin nylon coverall of fluorescent pink that could easily be spotted by rescue parties if a jumper landed far from main target area.

All six volunteers were experienced jumpers. There was no limit to the height from which each was willing to drop. In addition to the regular flying examinations, we were put through a series of physiological and psychological tests, then whirled around on a human centrifuge until it was determined how much acceleration would cause each to black out.

Passing these, we made simulated free falls from 43,000 feet in a refrigerated chamber and got further schooling in the use of all the equipment that would drop with us. On the basis of all this and the test jumps as they progressed, Capt. Randall A. Briggs, a flight surgeon, was to be the sole judge as to who would jump at the highest altitudes.

Holloman, a center for upper-atmosphere and guided-missiles research, was selected as the test site because it already had the elaborate high-altitude radar and other instrumentation we needed. It was almost like using a laboratory without a ceiling or walls.

For example, one radar station tracked and directed the pilot of our plane throughout the flight pattern to insure that the drop occurred at the point where we could get the best instrumentation data. Other stations would follow the actual jump to determine the time and altitude of the parachute-opening sequences and rates of fall.

Since the automatic ejection seat had proved successful for high-speed escape at lower altitudes, we



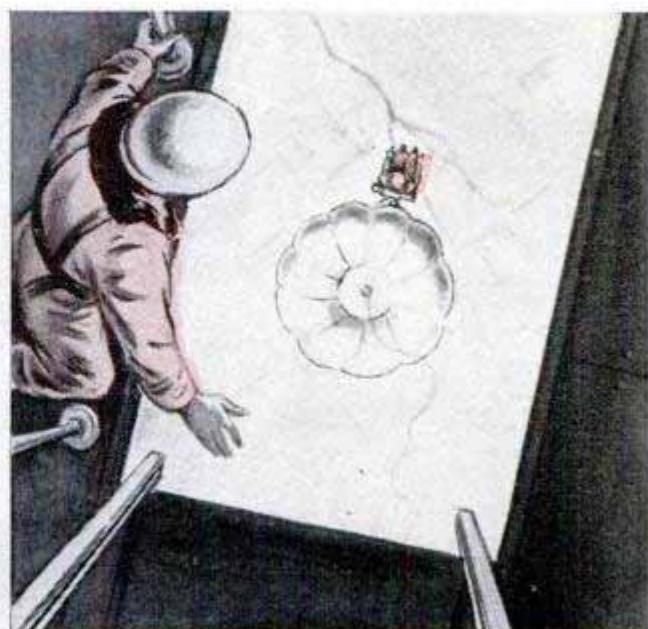
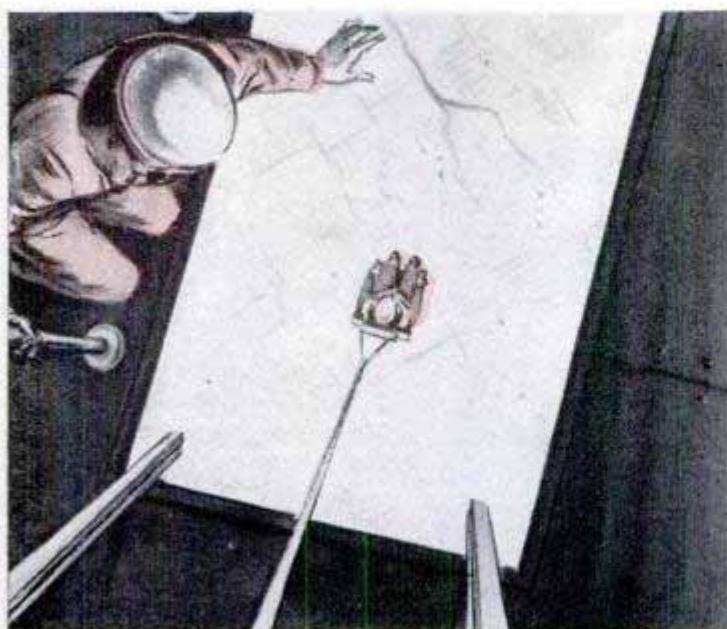
thought it logical to adapt it as well to the high-altitude escape system. Besides proving the practicality of automatic equipment for long periods of fall, an equally important purpose was to learn all we could about what happened on the way down. The chair served very nicely as a carrier for the bulky, heavy equipment that was required. A 40-inch-wide parachute stabilized the chair during its fall, while retarding its drop only slightly. It was opened by a 15-foot-long static line attached in the airplane.

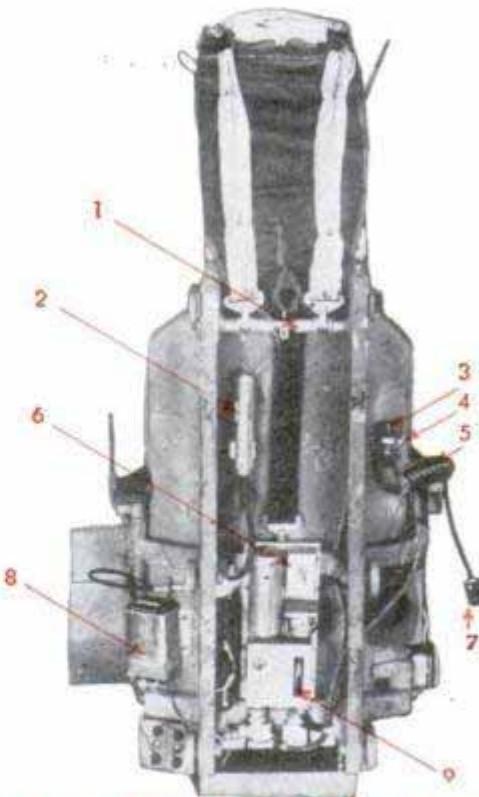
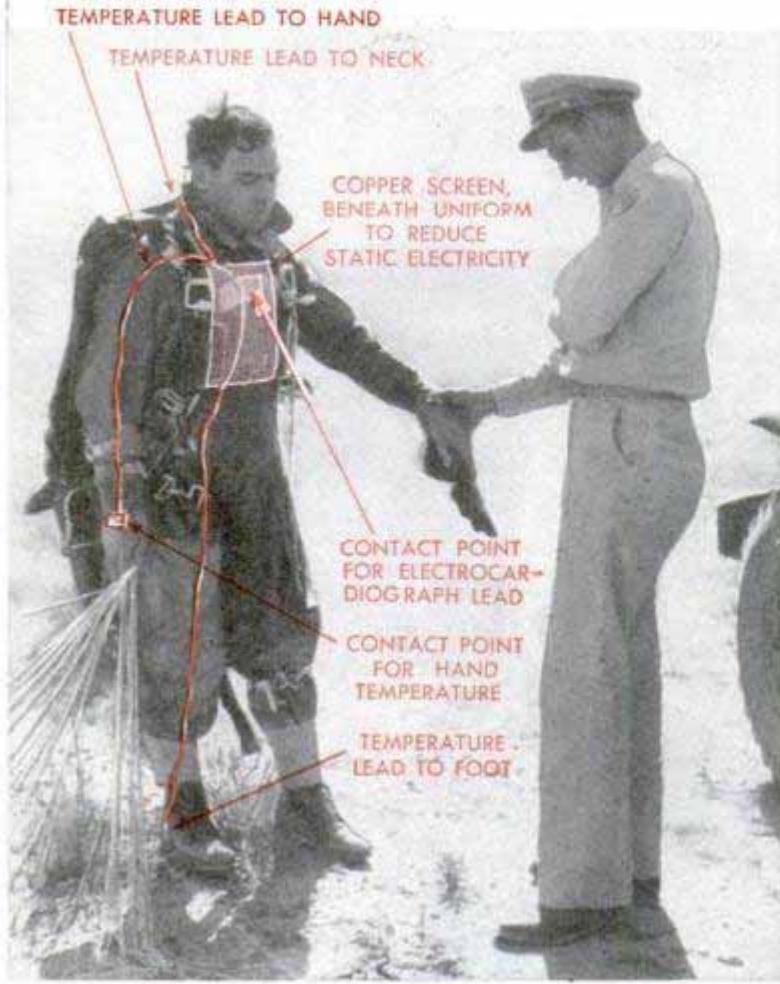
Over our flying garb we wore an additional thin nylon coverall, a bright fluorescent pink that would make it easier for the cameras to spot us in the sky. Our white helmet and green Plexiglas face visor provided more color contrast. In one pocket we carried colored signal panels to attract rescue parties if the impact point was difficult to find.

A stop watch and an altimeter were sewn to the right sleeve and a knife—to cut away the seat belt if both automatic and manual releases failed—was sewn to the trouser leg. Altogether, our clothes and equipment attached to us weighed 70 pounds.

Our conveyance quickly got nicknamed "the hot seat"—for obvious reasons. Its back was packed with batteries and transformers

Three sketches below, left to right, are an artist's impression of the chair rolling down the vertical rails and out of the bomb bay of B-17. Above, side view of chair, at the approximate angle at which it fell





1—DISCONNECT BAR FOR DRAG CHUTE. 2—HAND RELEASE FOR LAP BELT. 3—ATTACHMENT HERE LEADS TO JUMPER'S OXYGEN MASK. 4—BAILOUT BOTTLE OXYGEN CONNECTION. 5—AIRPLANE OXYGEN CONNECTION. 6—TELEMETERING TRANSMITTER. 7—CONNECTS TO JUMPER'S TELEMETERING EQUIPMENT. 8—BATTERY FOR TELEMETERING EQUIPMENT. 9—SWITCH BOX FOR TELEMETERING UNIT.

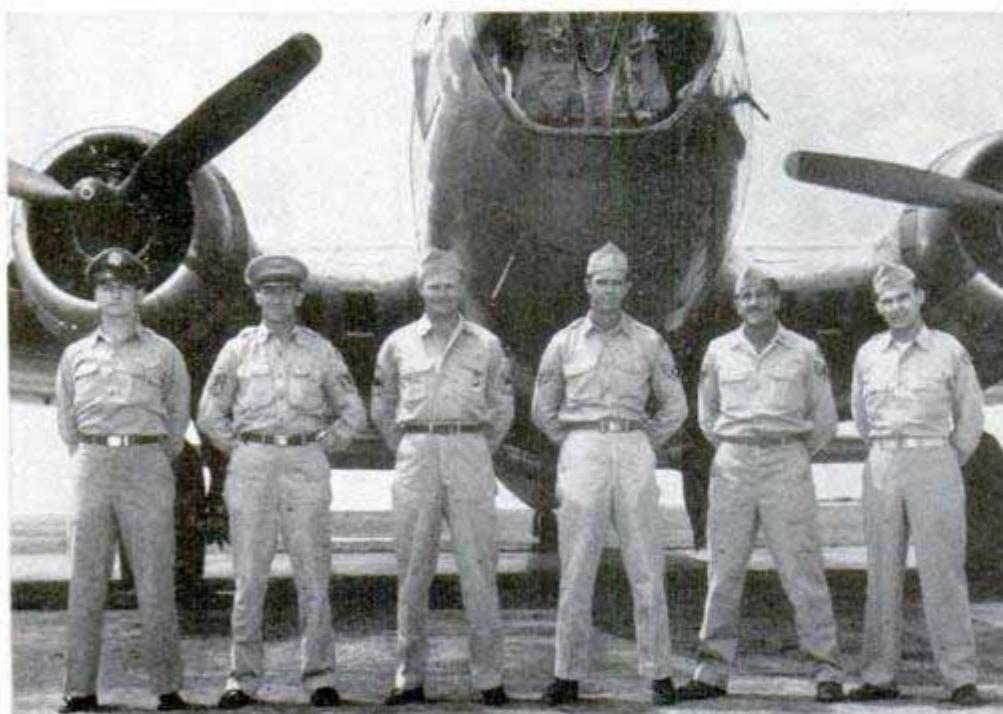
Minutes after an altitude-jump landing, the author has his pulse taken by flight surgeon, Capt. Randall A. Briggs. Right, rear view of an aluminum chair used in tests, identifying the complicated equipment it carried

for the telemetering and two-way radio sets, and the duplicate time and pressure devices that opened the big parachute. A four-spoke antenna extended below the footrest and both the small stabilization chute and a 16-foot-wide seat retarder chute emerged from a container behind the headrest. A manual emergency release for the

jumper's lap belt was on the right side, and on some drops we experimented with a hand-operated rudder on the left side to counteract the tendency of the chair to spin violently.

All our jumps were made from a B-17 specially equipped for high-altitude flying.

(Continued to page 262)



Test drops from above 25,000 to 42,176 feet were made by these six volunteers. Left to right, Capt. R. V. Wheeler, M/Sgts. J. F. Krul and J. D. Smith, T/Sgts. G. A. Post and V. A. James and the author, Capt. Vincent Mazza

Dual-Point Distributor Plate Boosts Acceleration

An increase in acceleration of up to 30 percent is possible with a dual-point replacement distributor plate designed for 1949 and 1950 Ford V-8s and Mercurys. Tests also show higher top speeds, increased point life and smoother performance throughout the entire engine range. The point life is increased because one point opens the circuit and the other closes it, dividing the electrical load.



Hydrogen Bombardment Makes Northern Lights

Science has finally explained the cause of the northern lights—it's a bombardment of the earth by hydrogen gas from the sun. The gas, flashing through space at 1800 miles a second, strikes the earth's atmosphere, producing the curtains of light known as the aurora borealis. This discovery was made by A. B. Meinel, instructor of astronomy at the University of Chicago, using an auroral spectrograph of his design. It has long been known that a relationship exists between sunspots and northern lights. Meinel's research proves that the hydrogen

gas released by the sun during periods of sunspot activity actually travels across space to the earth's atmosphere.



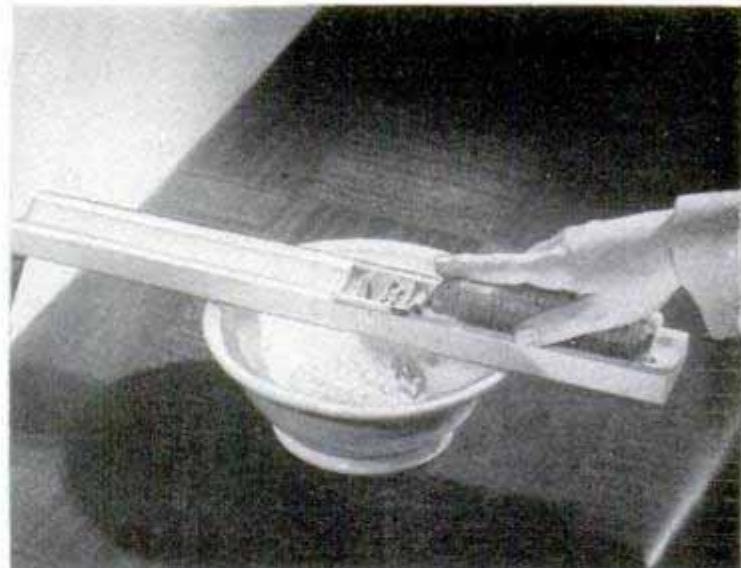
Whirling Arm

Whirling in a great circle at a top speed of 100 feet per second, a huge machine in a British laboratory tests the ability of men and materials to withstand rapid acceleration. The machine is a big arm which holds the item to be tested at a radius of 30 feet from the center of the instrument, then whirls it around a big room. In this way an instrument designed for a rocket can be tested for its ability to withstand high "G" effects, and studies can be made on the human body under quick acceleration. Also, models of aircraft can be checked for their performance while making turns and loops.

Information not listed on articles in the index, starting on page 14, frequently is listed in the WHERE-TO-FIND-IT LIST which is available to readers without charge from Bureau of Information, Popular Mechanics Magazine, 200 E. Ontario Street, Chicago 11, Ill.



SHOWER DEFLECTOR, below, controls spray so your hair stays dry without a cap. Also, it deflects water so you're not scalded while adjusting the flow

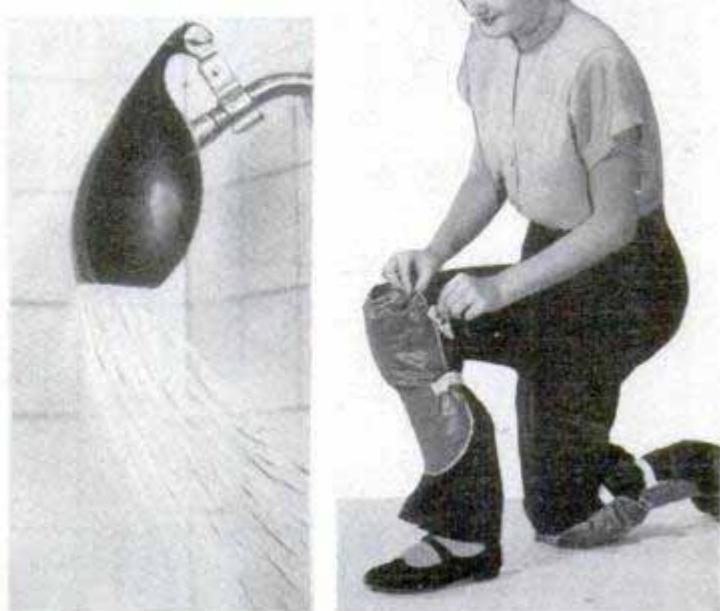


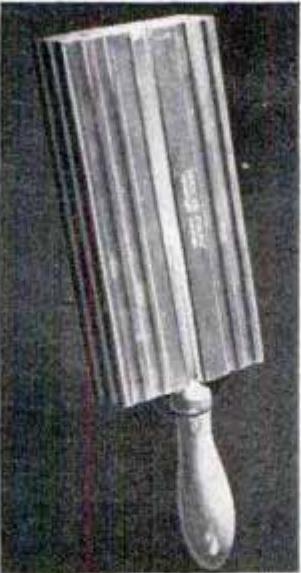
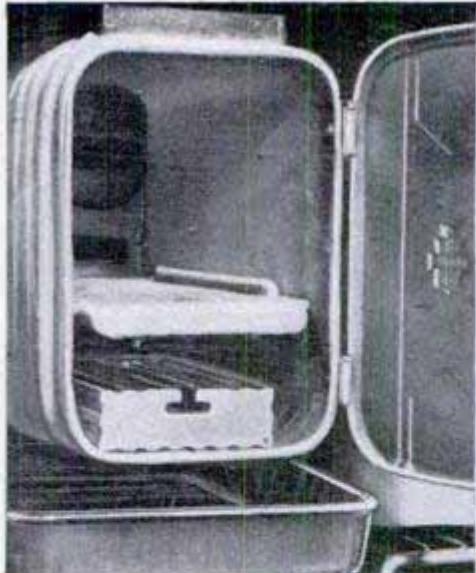
CORN CUTTER, above, slices kernels off the cob as you slide the ear along the groove and over the curved blade. You can adjust it to cut cream style, extracting "meat" of kernels and leaving the skins

WHAT'S NEW *For Your Home*

SHOULDER BASKET hangs on the line, at left, and over the shoulder, above left, to ease washday chore. It is also a dampening bag. You add water, close it tightly and the clothes are "sprinkled" automatically

KNEELING PADS, below, are one way to prevent housemaid's knee! Well padded, they are so flexible they don't interfere with movement. Covered with a tough plastic, they can be worn indoors or outdoors



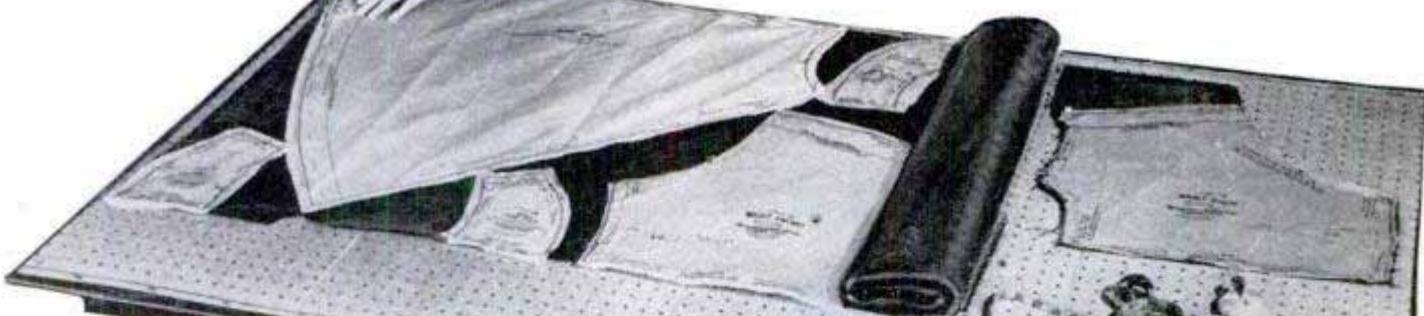


DEFROSTER BLOCK, above, clears freezer of ice in five minutes. Aluminum, it is heated on range before being slid into freezer. It has a removable handle



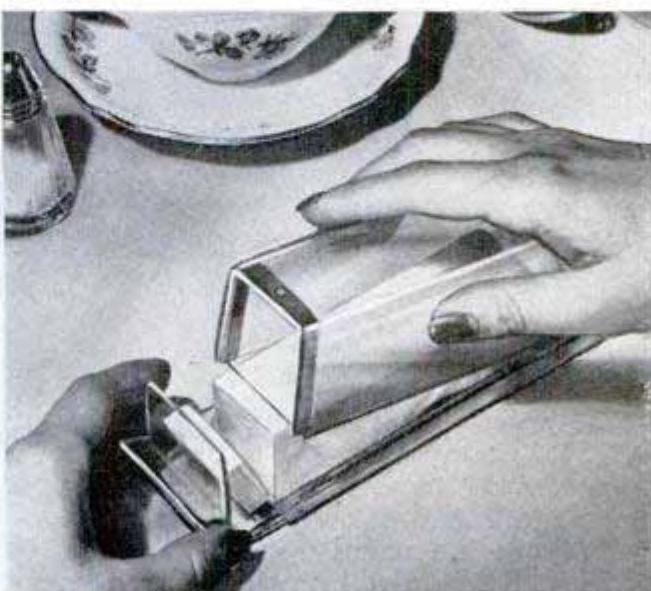
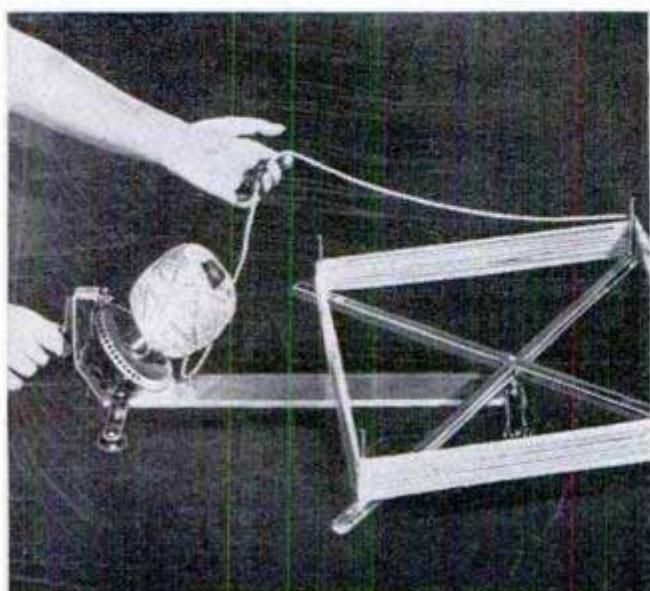
"**BENT**" **MIRROR**, above, pleases both young and old. Lower half tilts downward for the child (Mom can use it to check hemlines, too) and the top tilts upward for Dad

CUTTING BOARD, below, gives the home seamstress a professional sewing aid. The surface of the board is marked in grids for aligning cloth. Both cloth and pattern can be pinned to the board which folds for storage



YARN WINDER converts a skein into a neat ball of yarn in two minutes. All you do is turn the crank

BUTTER CUTTER makes neat pats for the table and also stores the butter in a clear-plastic container

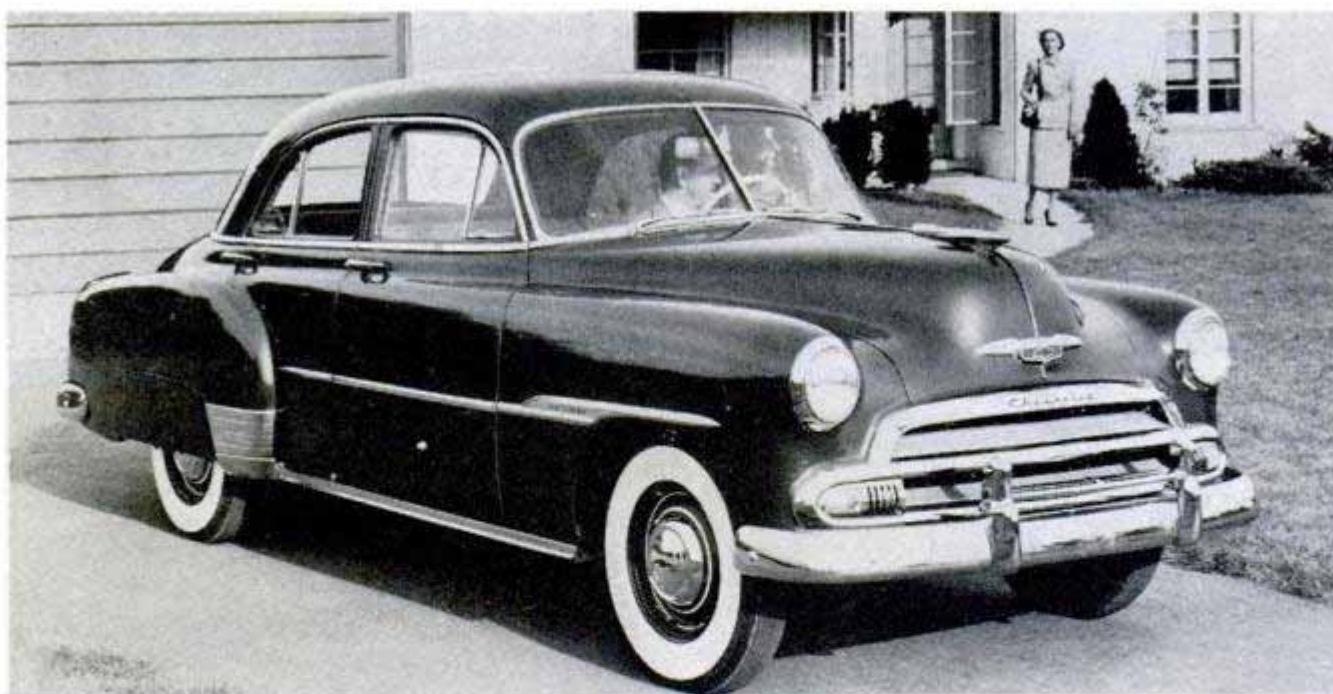




'51 Pontiac

Pontiac's 1951 line is distinguished principally by a new grille and body belt and rub moldings. Stainless steel is used this year for wheel covers and rear-fender gravel guards. Taillights have increased diameter and license lamps are now concealed in the bumper apron. Mechanically, Pontiac's improvements are topped by a 58-inch

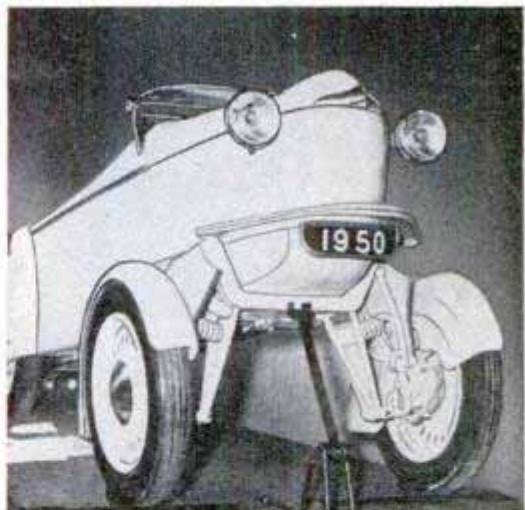
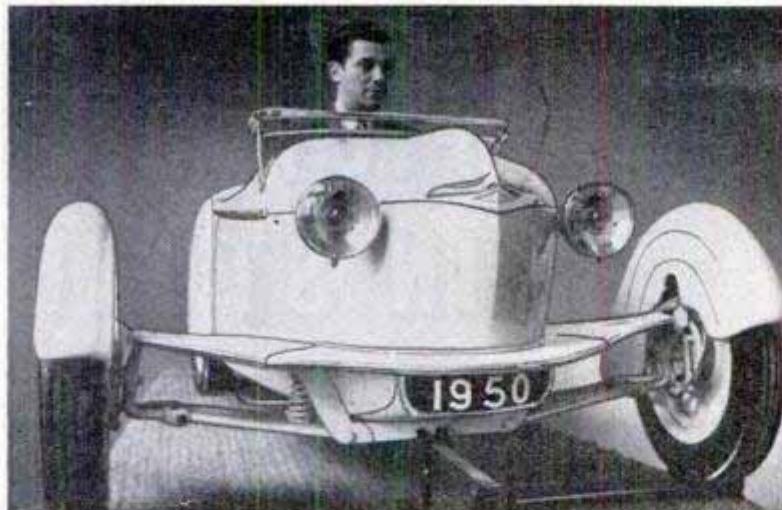
rear spring, six inches longer than in the '50 models. Thickness of the leaf springs has been increased for better cushioning. Another improvement is a more accurate fuel-tank gauge. The rheostat is relocated to let the float travel closer to the center line of the tank. Pontiac continues the six and eight engines and the Chieftain and Streamliner styling, either standard or de luxe. Hydra-Matic is again optional.



'51 Chevrolet

Chevrolet's most important changes in the 1951 models are hidden from view. Foremost is a new type of brake said to be the biggest in the low-priced field. It departs from the usual design. The shoe is fitted with a bonded lining and is self-ener-

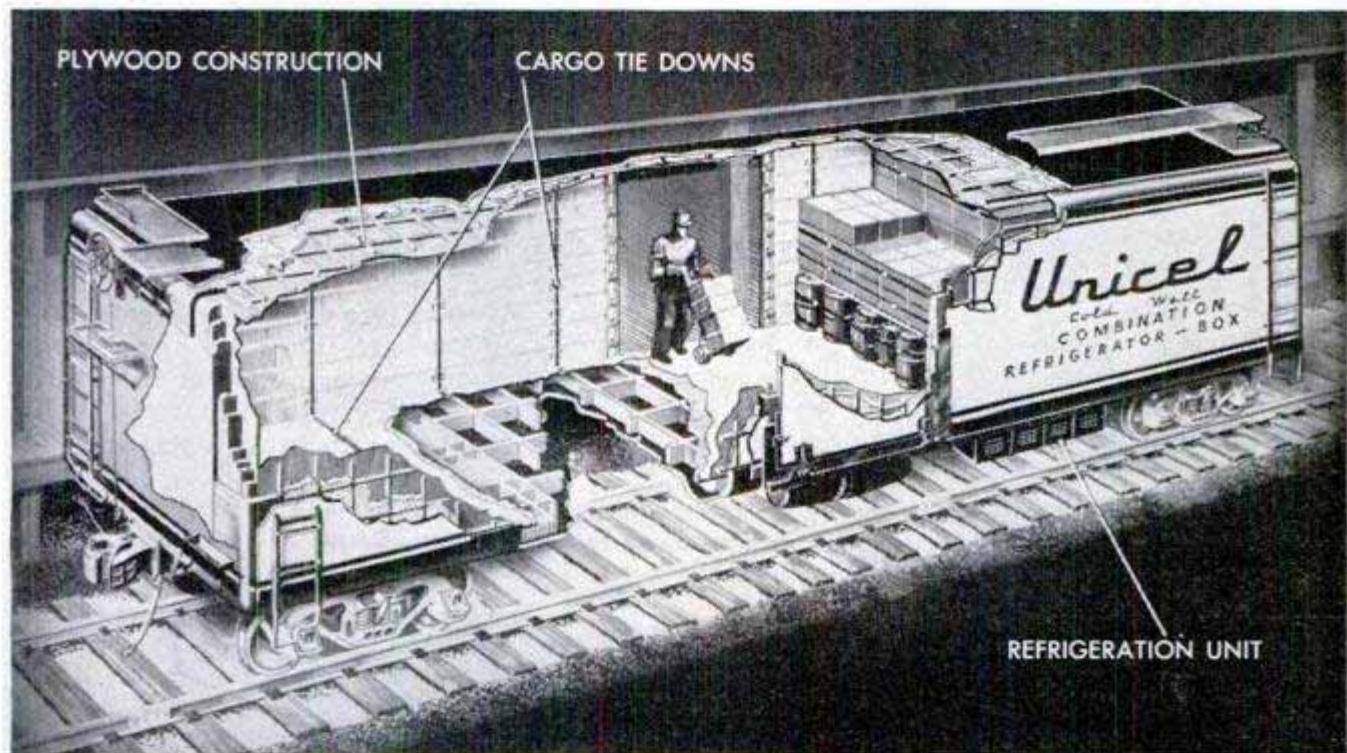
gizing in both forward and reverse. The brake operates with 25 percent less pedal pressure and virtually eliminates grabbing. Another hidden feature is flat S-type springs. Chevrolet has also recessed the control knobs on the dash. A rounded ledge above the panel eliminates instrument-light reflections from the windshield.



Car Has Retractable Wheels

Garage space is no problem for a new French car shown at the International Automobile Salon in Paris. It's a three-

wheel model and its two front wheels pivot inward so the car can be stored in a narrow shed or garage. On the highway, the wheels swing outward to provide a more conventional tread.



Combination Boxcar and Reefer

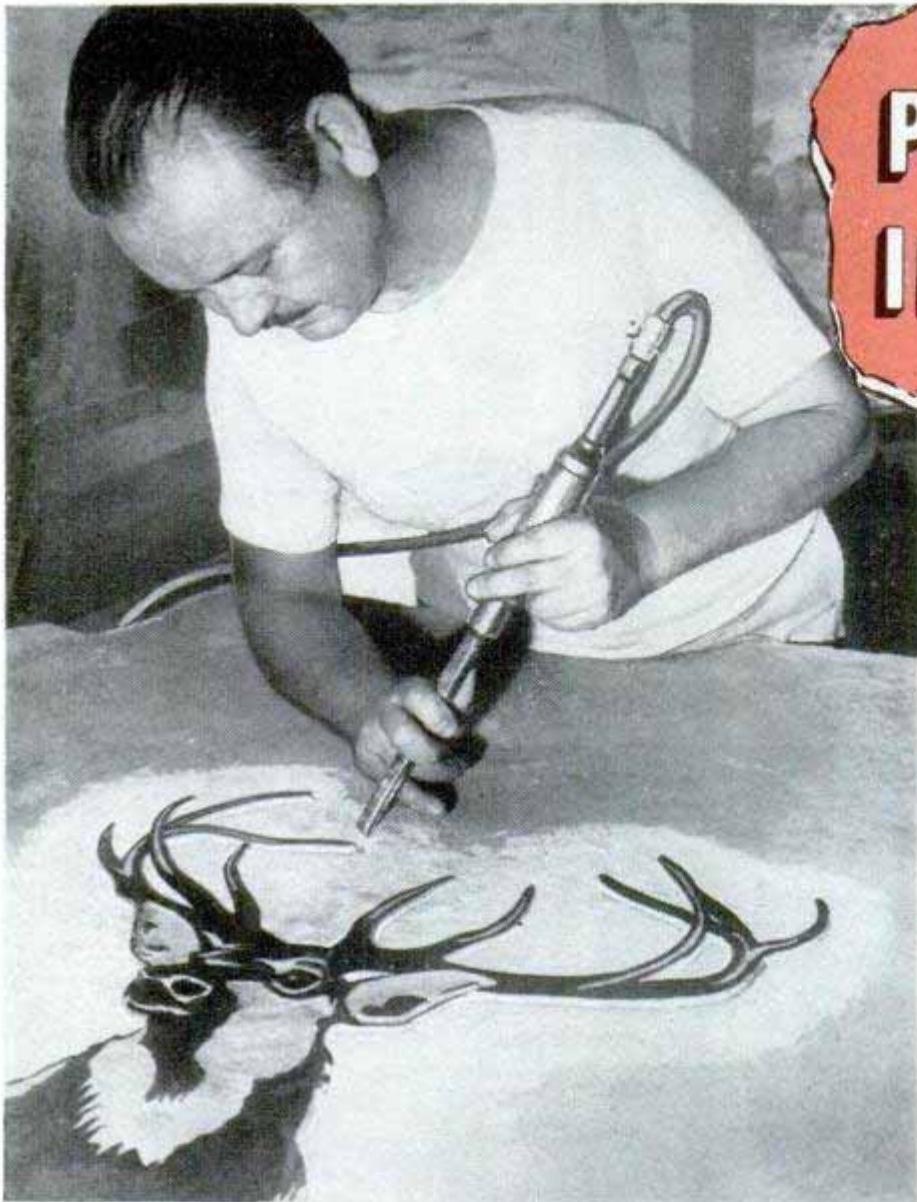
Cheaper to make, lighter yet stronger than the conventional freight car, a new model eliminates the center sill of steel that runs the length of the standard car. Instead, the car is formed of wood, plastic and metal molded into an organic whole so that stresses are distributed throughout the car. It can be used either as a boxcar or

as a refrigerator car. Refrigeration is provided by an automatic diesel unit. The interior has rounded corners and steel floor racks to make it easy to load and clean. "Cold wall" refrigeration keeps the temperature at any desired level. Used as a reefer, the car has a capacity 75 percent greater than an ice-bunkered car and 30 percent greater when used to carry ordinary freight.

Radar Measures Millionth of a Millionth

Radar now makes it possible to measure the space between atoms in a molecule to within a millionth of a millionth of an inch. A new instrument Westinghouse calls a microwave spectroscope determines their

precise positions by beaming ultrashort waves through gas molecules and "tuning in" on the vibrations of individual atoms. The average distance between them is six billionths of an inch.



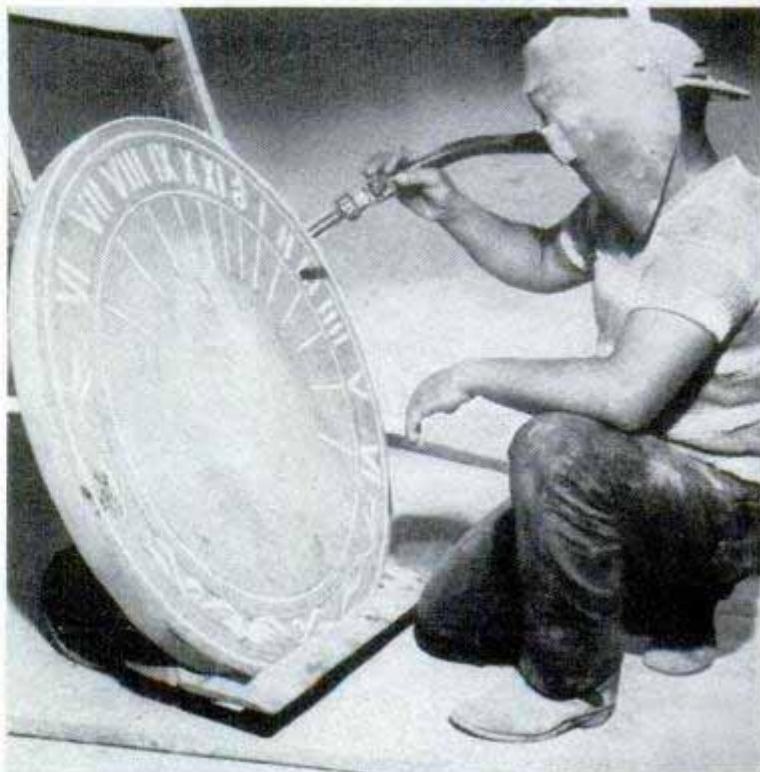
PICTURES IN STONE

By
Estey I. Reed

ARTISTS who "paint" with pneumatic chisels and wear protective masks may not look the part, but their work is definitely artistic. Their "canvas" is a slab of stone and their "brushes" are chisels and sandblasting nozzles, yet their artistry is beautiful and as long-lasting as the stone itself.

The Western Art Stone Works at Phoenix, Ariz., has been in business only two years, but already its art work is becoming known all over the country. An average of eight tons of flagstone is

Above, this artist uses a pneumatic chisel to "paint" the picture. He has to be right the first time. There is no way to cover up a mistake once you've chiseled away too much stone. Below, left, a striking picture made for a Chinese restaurant in Phoenix. Right, sandblasting the numbers on the face of a stone sundial



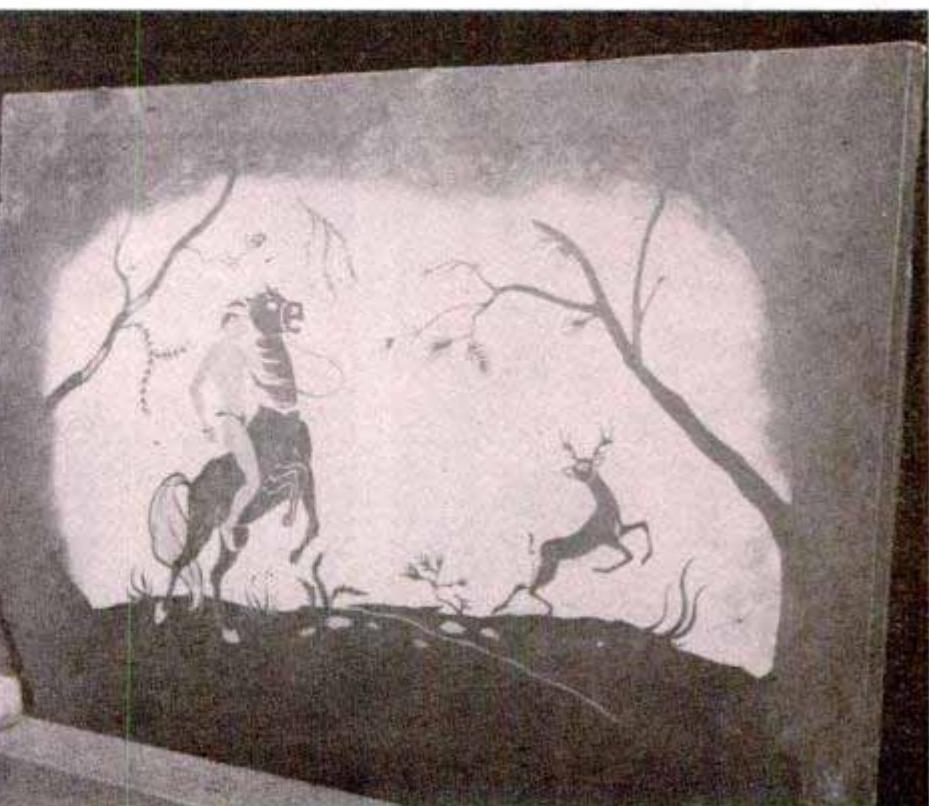
trucked to this unusual studio each week from quarries in northern Arizona. As delivered from the quarries, the thin slabs are roughly three feet square. They come in colors ranging from creamy white to a chocolate brown. Irregularly shaped when delivered, the slabs are trimmed to proper sizes and shapes for the pictures by an abrasive saw.

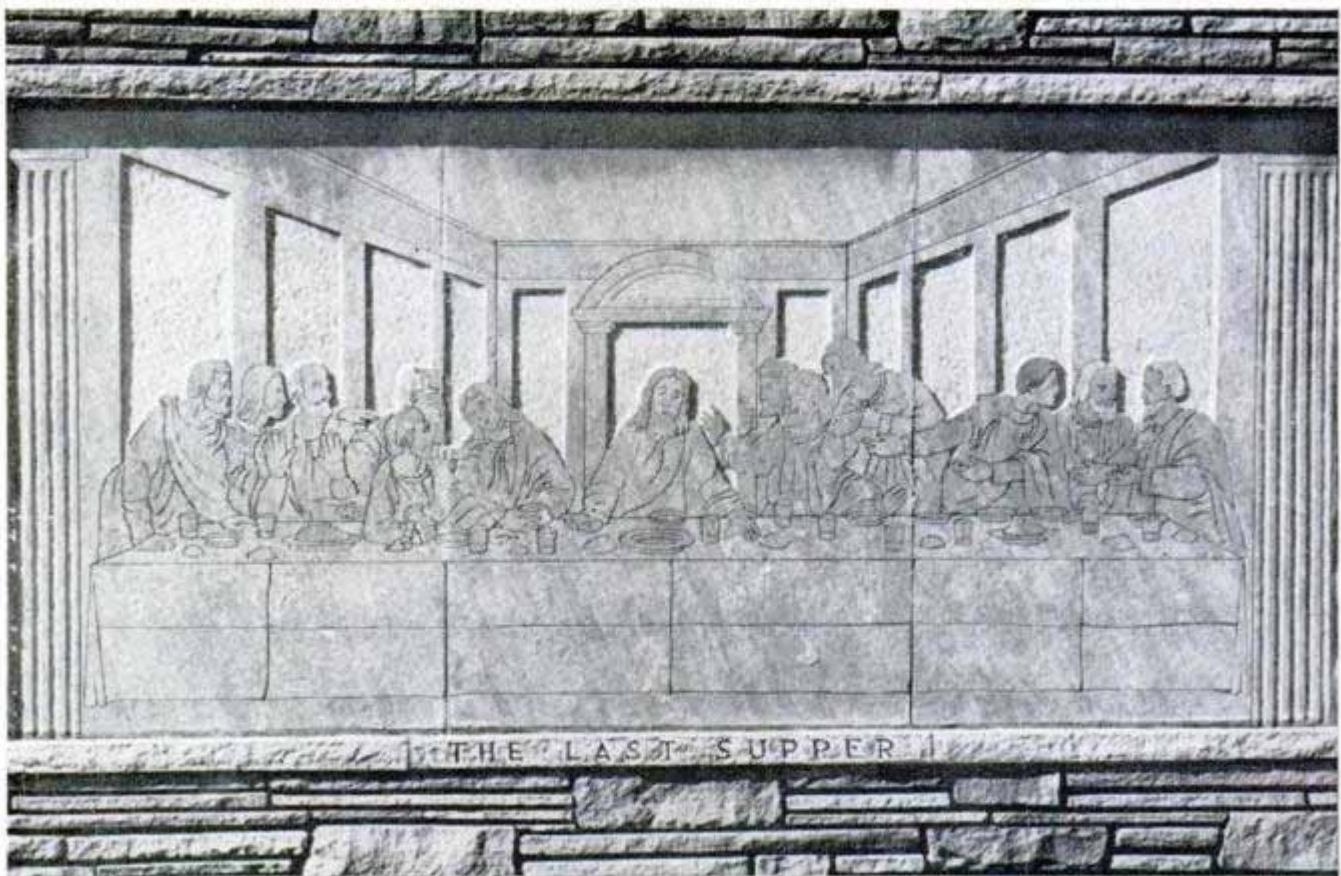
In the giant Arizona quarries, some covering 20 acres, the stone is found in thin layers of varying colors. The top layer may be brown, followed by tan, buff, gray and white. Sometimes the order is reversed or some shades are missing. In prehistoric times, sand, animal life and earth were piled up as water covered the land. Different types of materials were deposited at different times. Thus the varicolored layers. The decorative effects of this stone art are due to the unusually wide range of colors found in the quarries of Arizona.

If the slab is not the proper shade of brown, a



Above, favorite subjects for stone artists are Western scenes, one of which is shown here. It is one of the murals in stone made for a resort. Below, this large Indian hunting picture, measuring three by five feet, is typical of the kind becoming popular for over-the-mantel decoration





In this carving the artists used a brown stone with tan and white shades in the layers beneath the surface

special stain — concocted by the firm — is applied with a brush. This stain soaks into the stone, coloring it as the artist wishes. Then when the fine lines of the picture are cut with the pneumatic chisel, various shades are uncovered. Because the interior of the stone gets less of the stain, the deeper the cut, the lighter the shading.

After the artist has transferred the design to the surface of the stone in pencil, he indicates the shades and tones for each

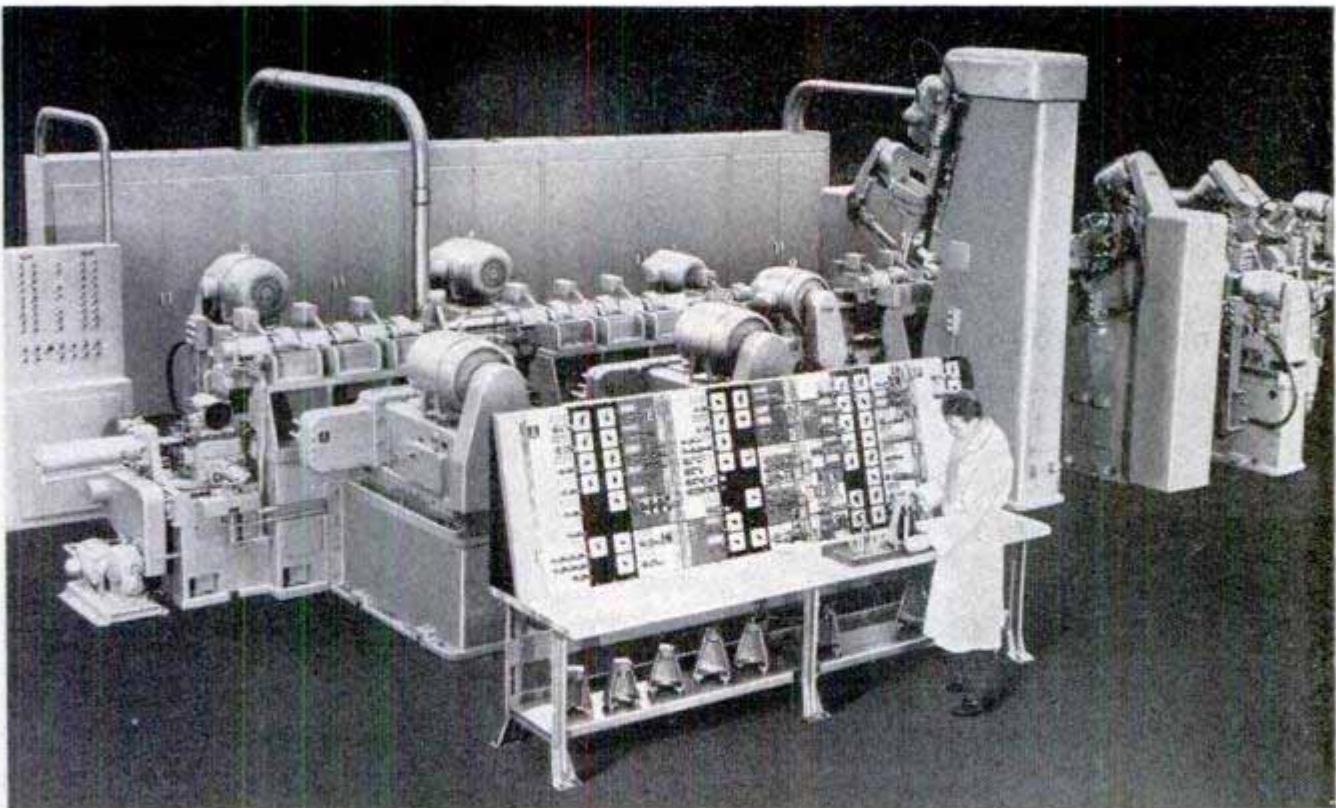
section. The skilled craftsman who carves the stone follows the artist's instructions as he reproduces the drawing in stone.

Many sportsmen order stone pictures for their homes or hunting lodges. The pictures, usually depicting outdoor scenes, are set into the fireplace above the mantel. The company also makes patios and does other masonry work, but its first love is "painting" pictures in stone—pictures by artists with pneumatic "brushes."

Stones used in the construction of walls and fireplaces have to be cut to uniform widths

Delivered from the quarries in irregular shapes, the stone "canvases" are trimmed to picture size on this abrasive saw





Above, control panel in foreground "supervises" the machines behind it, shutting them off when the cutting tools are worn out. Below, close-up of the panel and two tool-setting gauges



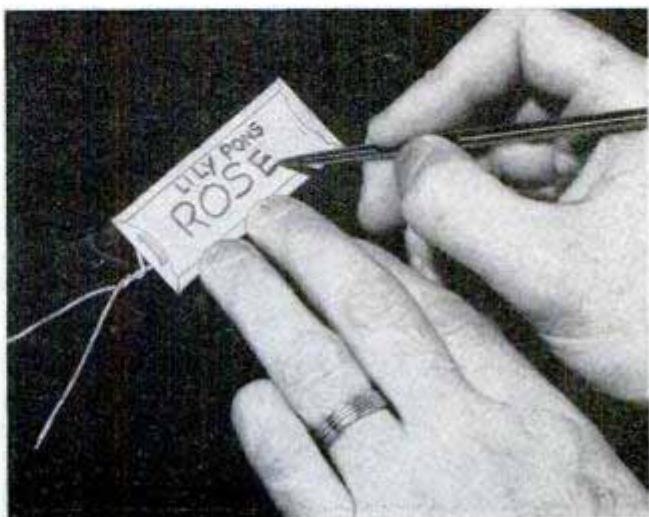
Aluminum Label for Plants

You can "engrave" plant identification on an aluminum label with an ordinary pencil or stylus. The label consists of a piece of soft cardboard tightly sealed inside an aluminum jacket. The writing surface is aluminum foil. When you print the identification, the foil is pressed into the cardboard to make a permanent, weatherproof tag for use in the garden.

Imports of British motor cars into the United States during the first eight months of 1950 were almost three times the total for the same period in 1949.

Control Unit Stops Machines When New Tools Are Needed

Every one of the 83 cutting tools in a complex machine for making transmission cases is continuously "supervised" by a mechanical control that shuts off the machine when any tool wears out. Index counters on the control panel show the unused portion of each tool's efficient life. When a tool exhausts its "life expectancy" and the machine shuts down automatically, all tools with less than two hours of life remaining are changed at the same time, reducing "down" time as much as 82 percent. The control panel has special tool-setting gauges and storage space for tools and holders to reduce the time required for change-overs.



IF THE A-BOMBS BURST--

Here is what to expect,
what you can do today to prepare yourself,
what you can do then to survive

By Clifford B. Hicks

Part I

8:15 a.m., August 6, 1945. A single plane flies over the city. The only warning is a blinding flash of light. A ball of fire explodes in the sky, hanging there for a moment as it grows in size and fury. Then in a crackling instant the world's second atomic explosion races down to strike the earth at a spot called Hiroshima.

Sixty seconds later 70,000 Japanese are dead, caught above ground. The heart of the city has been blasted into rubble which still plummets down on the dead and dying.

10:15 a.m., January 2, 1950. A stenographer in Manhattan shrugs her shoulders over her mid-morning cup of coffee and says to her girl friend, "I'm tellin' you, there's nothing you can do to save yourself

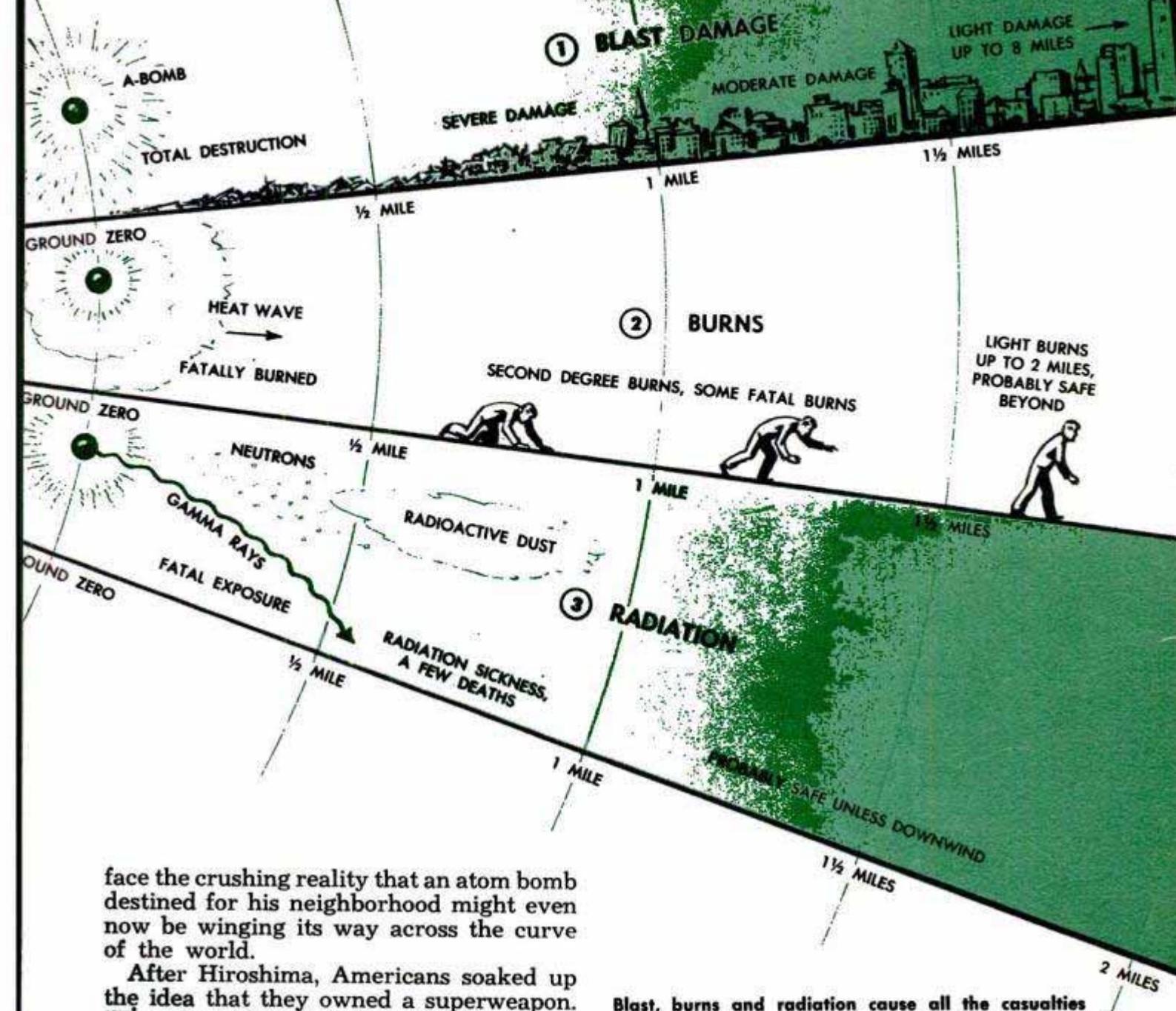
—just one bomb will wipe out New York. Me, I'm headin' for the country if things get worse."

At the same moment the sky above Chicago's Loop is split by a bright flash of lightning from a sudden winter storm. A nervous executive freezes in terror for an instant, then smiles sheepishly as he returns to the morning mail. But he can't help wondering whether the bomb would demolish his home and kill his family in a suburb 14 miles away.

Now, 4½ years after the atom bomb dropped toward its first target, the threat of a nuclear fireball hangs over every major American city. The residents of New York or Gary, Washington or San Francisco must

Japanese landscape: Main Street, Hiroshima, shortly after the first atomic air burst. Reinforced concrete withstood blast the best





face the crushing reality that an atom bomb destined for his neighborhood might even now be winging its way across the curve of the world.

After Hiroshima, Americans soaked up the idea that they owned a superweapon. "There's no defense." Now, the Manhattan stenographer and the Chicago suburbanite shrug their shoulders in resignation. They are victims of a distorted belief that an entire city can disappear in a whiff of nuclear fission. If a bomb drops, the city dweller figures, there's little he can do to save himself or his family.

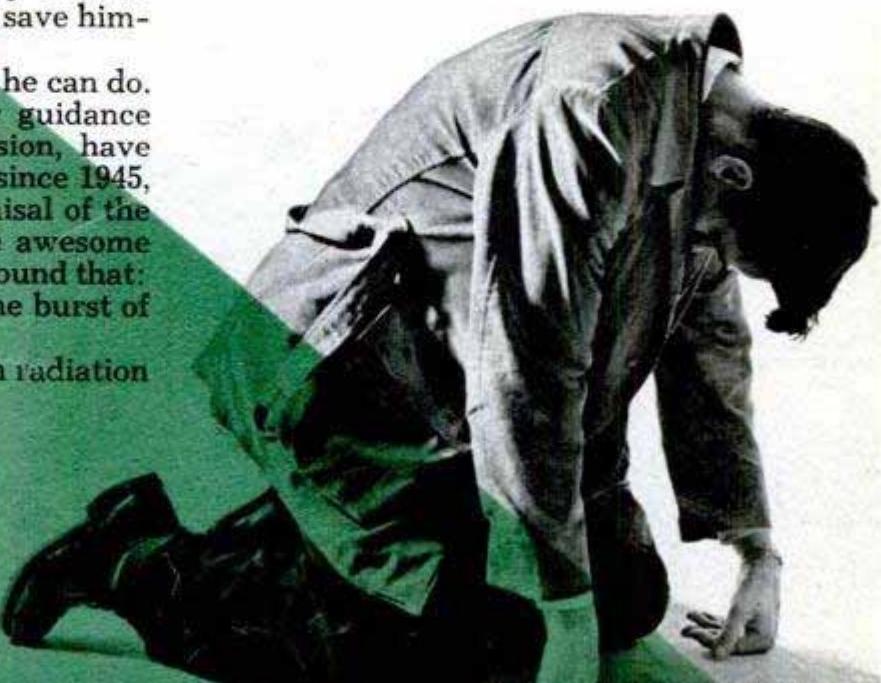
There are a great many things he can do. Hundreds of scientists, under guidance of the Atomic Energy Commission, have been groping into the unknown since 1945, working toward a realistic appraisal of the bomb. With full respect for the awesome power of the weapon, they have found that:

No big city will disappear in the burst of one Hiroshima-type bomb.

There is much less danger from radiation than originally supposed.

Shelters are effective. (In Nagasaki, a few hundred people who were in tunnels almost directly beneath the burst of the A-bomb are alive and healthy today.)

Blast, burns and radiation cause all the casualties in an A-bomb burst. In diagram above, the legends show the effect of each of these three dangers at various distances from ground zero. Whether you live or die depends upon your location and protection





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If you are caught in the open without warning, dive to the ground and protect your head from flying fragments



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Your only warning may be a bright flash of light.
If a doorway is near by, leap into it immediately

There's not much danger that a big area will be contaminated with radioactivity for a long time—at least from an air burst.

Given a few minutes' warning, you probably can save your life even if you are fairly close to "ground zero," the point directly beneath the burst.

The Manhattan stenographer wouldn't have such a bleak, defeated outlook if she studied the facts uncovered by the AEC and if she digested the information published by the Office of Civil Defense of the federal government. She'd find that there's not much that man can do to save his buildings, but there's a great deal he can do to save his life.

Atom bombs kill people in three ways: by blast and its effects, by burns and by radiation.

Blast. In a bomb of the Hiroshima type, exploded at 2000 feet, virtually everything on the surface within $\frac{1}{2}$ mile of ground zero is blasted into rubble. Draw an imaginary circle $\frac{1}{2}$ mile around your home and

Inside a building? Dive instantly to the floor and crawl beneath a desk or table. Cover exposed skin areas

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you'll get an idea of the area that would be completely destroyed. Above ground, your chance of staying alive would be virtually zero.

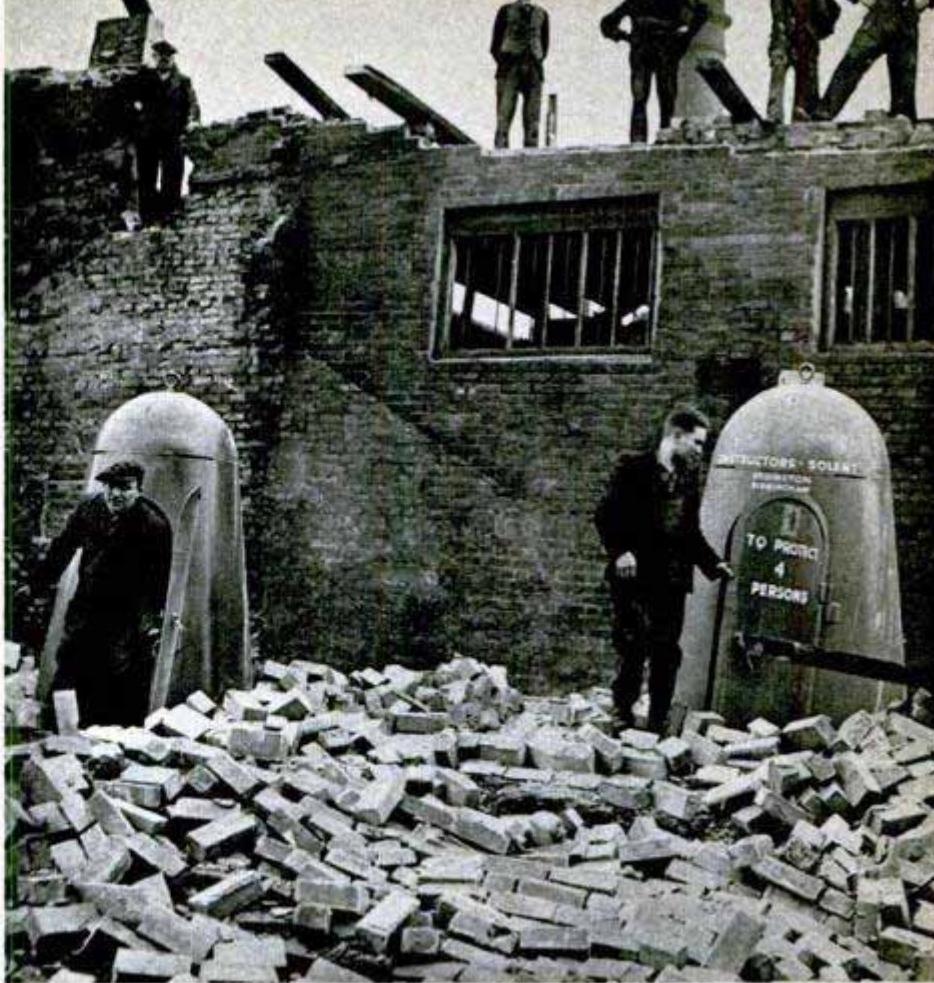
Severe damage ranges out for a mile, moderate damage to more than $1\frac{1}{2}$ miles, and very light damage, such as broken windows, to a radius of eight miles. Thus, a mile from ground zero you'll be in serious danger. At $1\frac{1}{2}$ miles you probably won't be hurt unless, through a freak of fate, a wall caves in on you or a chunk of debris strikes out for the spot you occupy. Beyond that radius your chances are good, though you may suffer cuts from splinters of glass.

About 50 to 60 percent of the fatalities from the two bombs dropped on Japan were caused by blast and its effects. But there is one fact of overwhelming importance: virtually every person killed was above ground. At Hiroshima, the radar operator failed to sound the alarm because he thought the plane he spotted on his scope was only coming over for reconnaissance.

Burns. The bomb explodes in a ball of fire with a temperature of 1,000,000 degrees Centigrade. The ball actually is so hot that it heats the surrounding air to luminescence, just as a fluorescent light glows. From this comes the blinding flash.

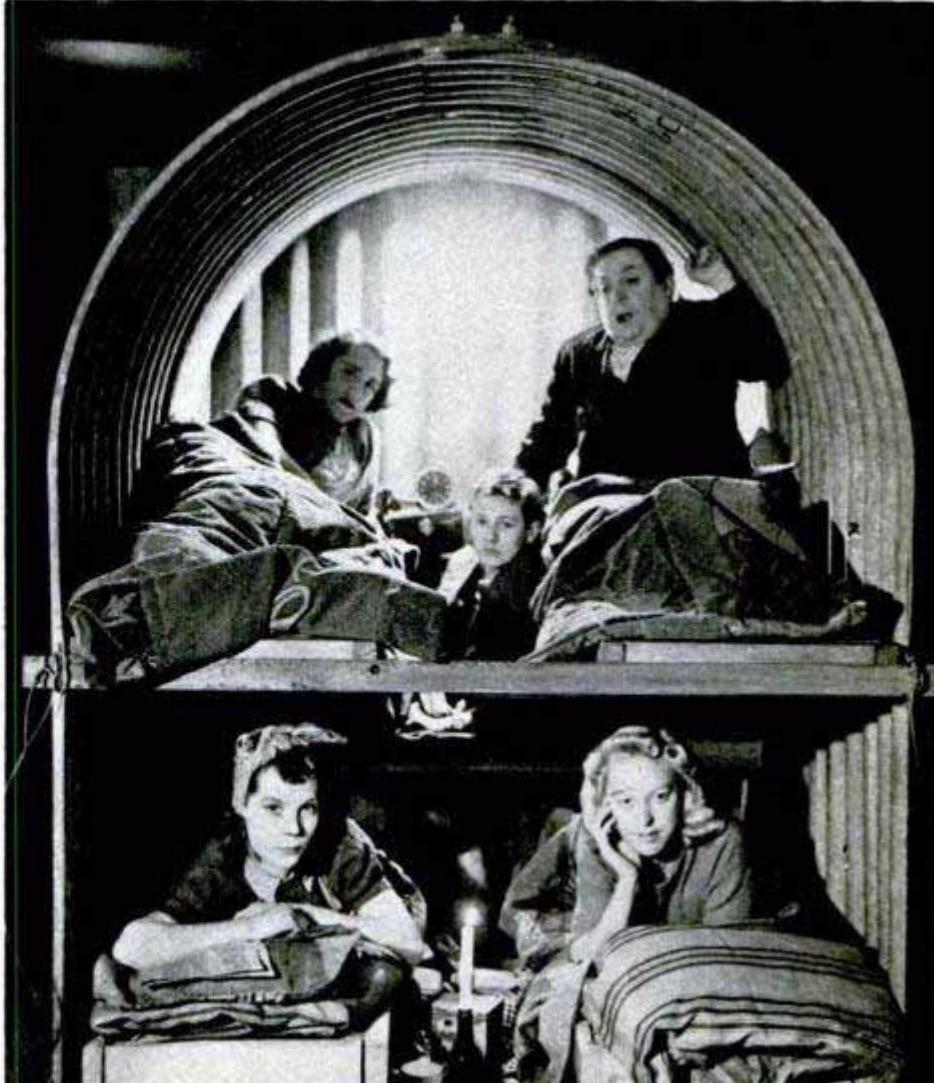
Out from the ball of fire rolls a wave of thermal radiation—heat—which can raise the temperature of a person's skin 50 degrees Centigrade at a distance of more than $\frac{3}{4}$ mile. This searing wave accounted for 20 to 30 percent of the casualties in Japan. It literally burned the skin off its victims. But the wave of heat can't turn corners. All the flash burns in Japan were oriented to the direction of the bomb—anything in shadow from the bomb flash was not burned at any distance away. Many victims had their faces or arms burned right up to the point where their hats or sleeves came—and no farther.

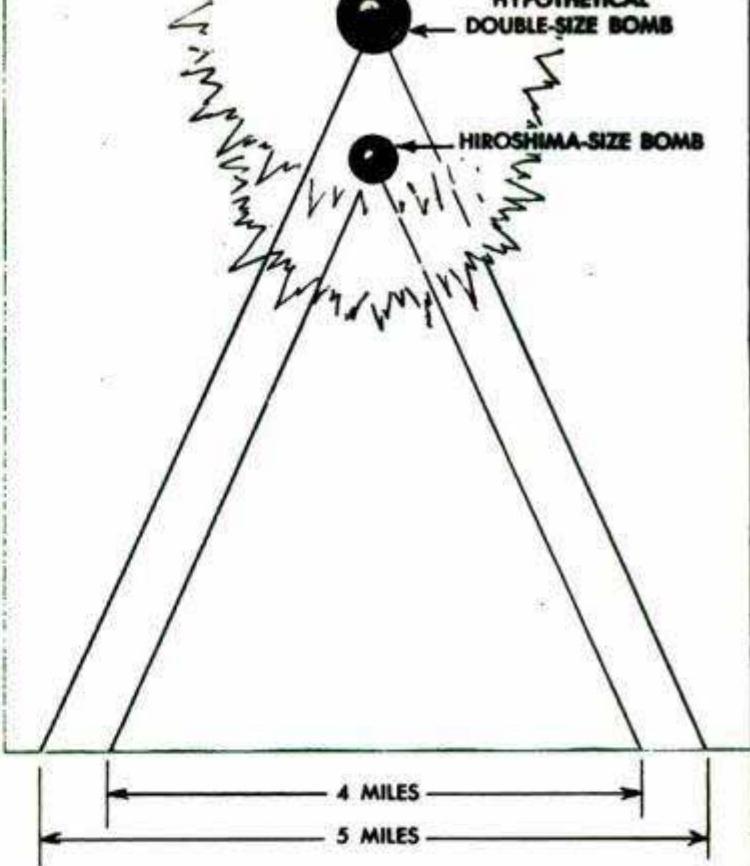
It's virtually certain that anyone caught unprotected on the surface within $\frac{1}{2}$ mile of ground zero would be fatally burned, but this also is the radius of complete blast destruction. Beyond $\frac{1}{2}$ mile there would be second-degree burns,



Tons of masonry are dropped on a British shelter to test it. British civil-defense officials believe that a shelter of this type, or the "Anderson" shelter shown below, when covered by three feet of earth could protect a man very close to ground zero

British Information Services photo





Fashion plate, Atomic Age. Monitoring team, wearing protective clothing, checks radioactivity in a rehearsal with Geiger counters. Diagram shows that doubling size of bomb won't double its diameter of destruction

fatal in some cases. The temperature of the thermal wave falls off rapidly beyond a mile.

Radiation. This danger from the bomb has been overpublicized because it is unfamiliar. Though it caused many deaths in Japan, it was directly responsible for no

more than 15 percent of the total fatalities.

Three types of radiation can injure you:

Gamma rays cause destruction inside the body. They have great powers of penetration but they can't render radioactive the material they penetrate. Unprotected persons within $\frac{1}{2}$ mile of ground zero would

In preparing a shelter, nail heavy cloth or wire screen across windows to cut down fragments of flying glass
Copyright RKO Radio Pictures, Inc.



WHAT TO PUT IN YOUR SHELTER



be killed by gamma rays—but this, again, is the radius of complete blast destruction and fatal burns. The danger from gamma rays falls off rapidly with distance. Although there might be a good many cases of radiation sickness beyond $\frac{3}{4}$ mile, there would be few fatalities.

Neutrons, the split particles of atoms, also cause death. They render radioactive the materials they strike, but they haven't the driving penetration of gamma rays. They are effective only at shorter distances, so anyone protected from gamma rays also is protected from neutrons.

Fission products from the bomb can contaminate an area. This is the radioactive dust which settles down from the bomb and is called the "fall out." Man can survive a certain amount of exposure to these particles, but he can't work near them for long periods. A "lethal dose" is gradually built up in his body.

The big danger is that these particles from the fall-out will enter the body through the nose, mouth or open wounds. Inside, they continue to emit radioactivity until the lethal dose has been achieved—and the man dies.

It is significant that these three effects of the bomb—blast, burns and radiation—all reach out to a danger limit, on the sur-

PREPARE YOUR BOMB SHELTER

CHOOSE STRONGEST CORNER OF BASEMENT
STRENGTHEN JOISTS OR POUR CONCRETE CEILING

BAFFLE ALL EXITS
NAIL HEAVY CLOTH OR
SCREEN OVER WINDOWS

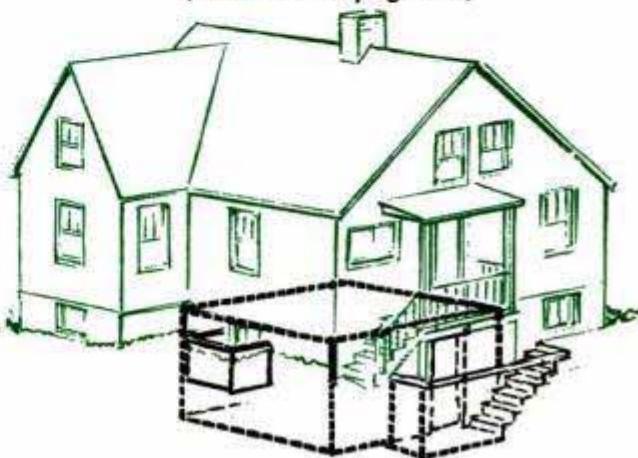
TWO POSSIBLE EXITS

face, of no more than two miles. Beyond that, except for freaks of coincidence, a man's chances of surviving are excellent even though he may be above ground.

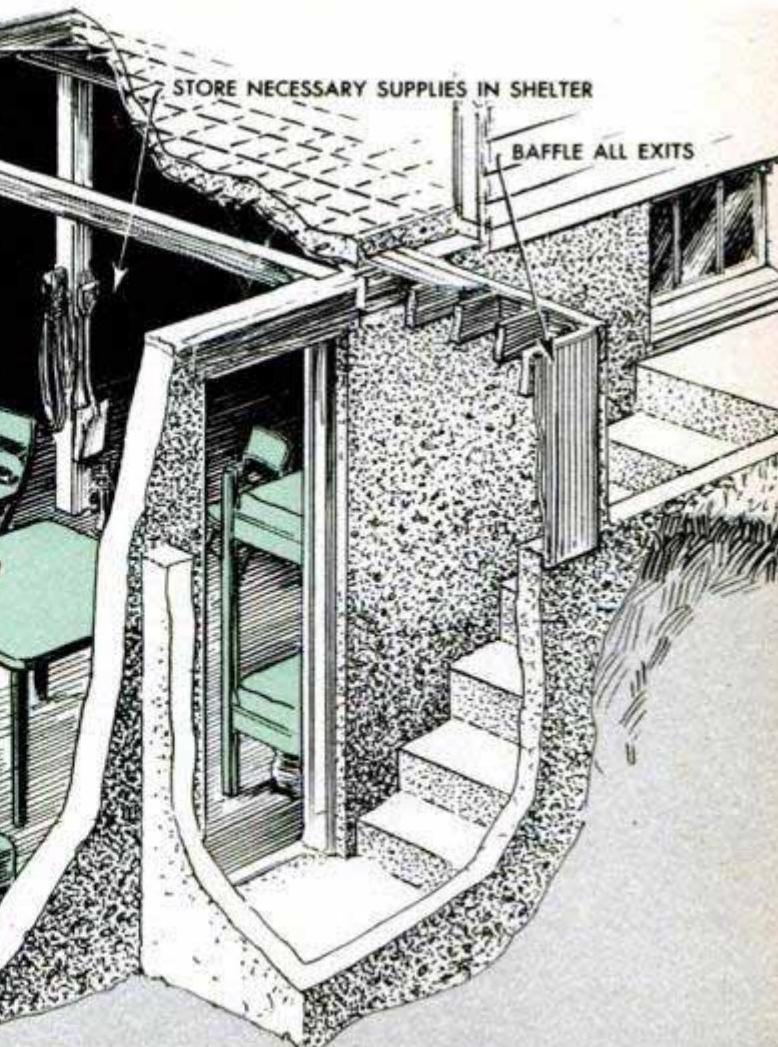
Because distance is man's best protection, the first question anyone should ask is "How close am I to an A-bomb target?"

According to one estimate, an atom bomb costs from \$1,000,000 to \$5,000,000. These blue-chip weapons won't be wasted on poor targets. The National Civil Defense Office considers you a potential A-bomb victim if you live in one of the critical target areas which have been designated.

(Continued to page 248)



Bomb shelter in the basement of a home affords some protection. If a concrete ceiling can't be poured, the overhead joists should be strengthened. Shelter should be stocked with equipment, food and water



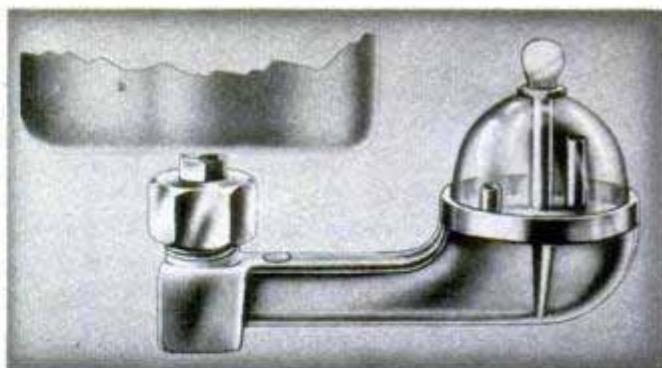
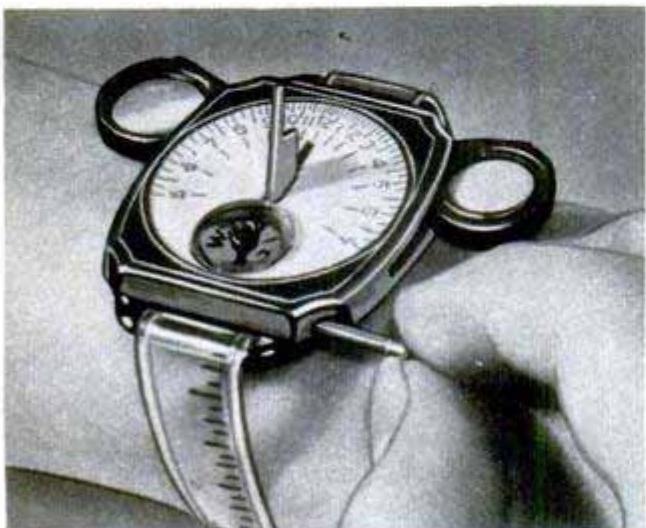


Dice That Roll No More

There are 88 pounds of dice in a lamp made by Chick Harms of Covington, Ky., as a sparetime activity. Altogether 5240 dice were used and the task took eight weeks. The materials in the lamp have a value of \$1157, according to the builder.

Sundial Toy "Watch" Has Eight Other Uses

Aside from telling time with its miniature sundial and pointer, a toy "watch" offers eight other services to dazzle youthful owners. At the base of the watch is a compass that glows in the dark. A magnifying glass and a weather forecaster (which changes color to predict sunshine or rain) slide out from either side. Another appendage is a tiny ball-point pen. The Morse code and a constellation chart are etched on the underside of the dial and the shiny back doubles as a signaling device. The colorful plastic wrist strap is marked and numbered like a tape measure.

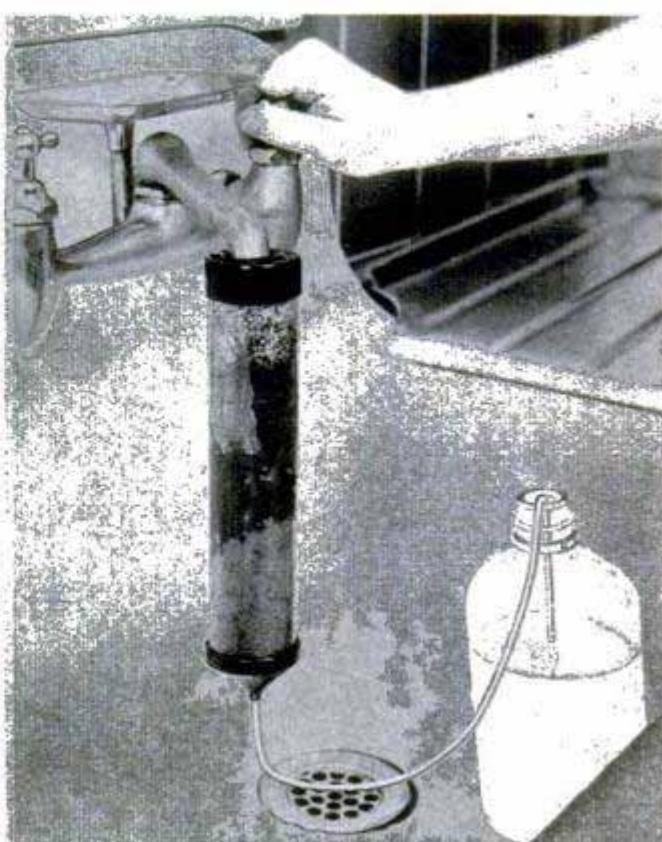


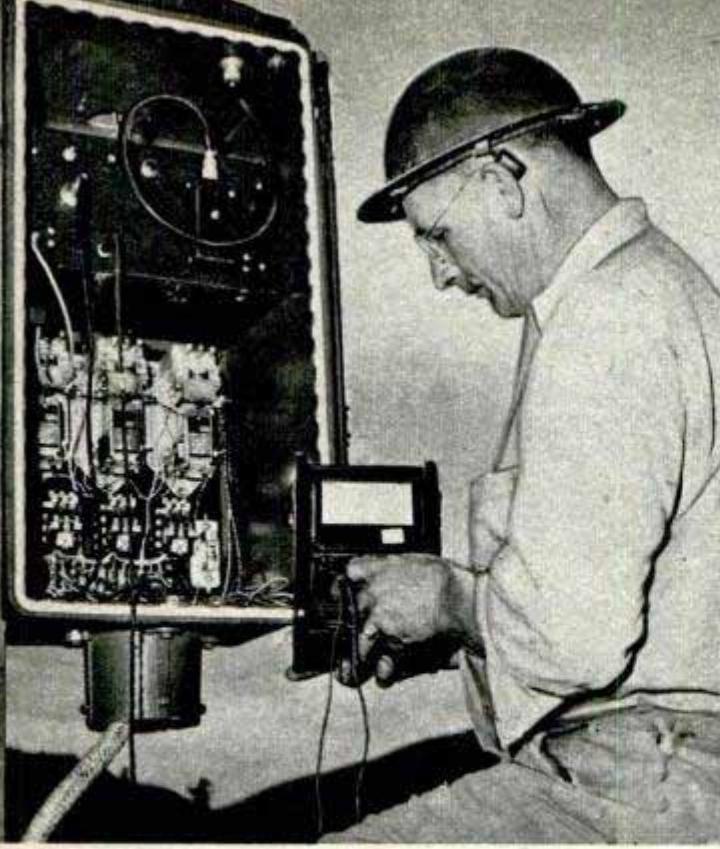
Motor-Oil "Peep Hole"

Motorists can check the condition of the oil in their engines visually as it runs through a glass inspection dome that connects to the filter outlet line. The dome also provides a means of detecting worn-out filter cartridges. By periodically examining the color and rate of flow of the oil as it runs through the dome on its way to the crankcase, the motorist can tell when oil changes or filter changes are necessary.

Resins Produce Pure Water By Filter Process

Simply attached to the kitchen faucet, a tube filled with a mixture of artificial resins known as Amberlites will remove all dissolved material from the water supply. A color indicator in the resins shows when it is time to replace the filter. Large-size models are produced for photographic darkrooms and battery shops, where pure water is essential, as well as giant models for industrial installations.





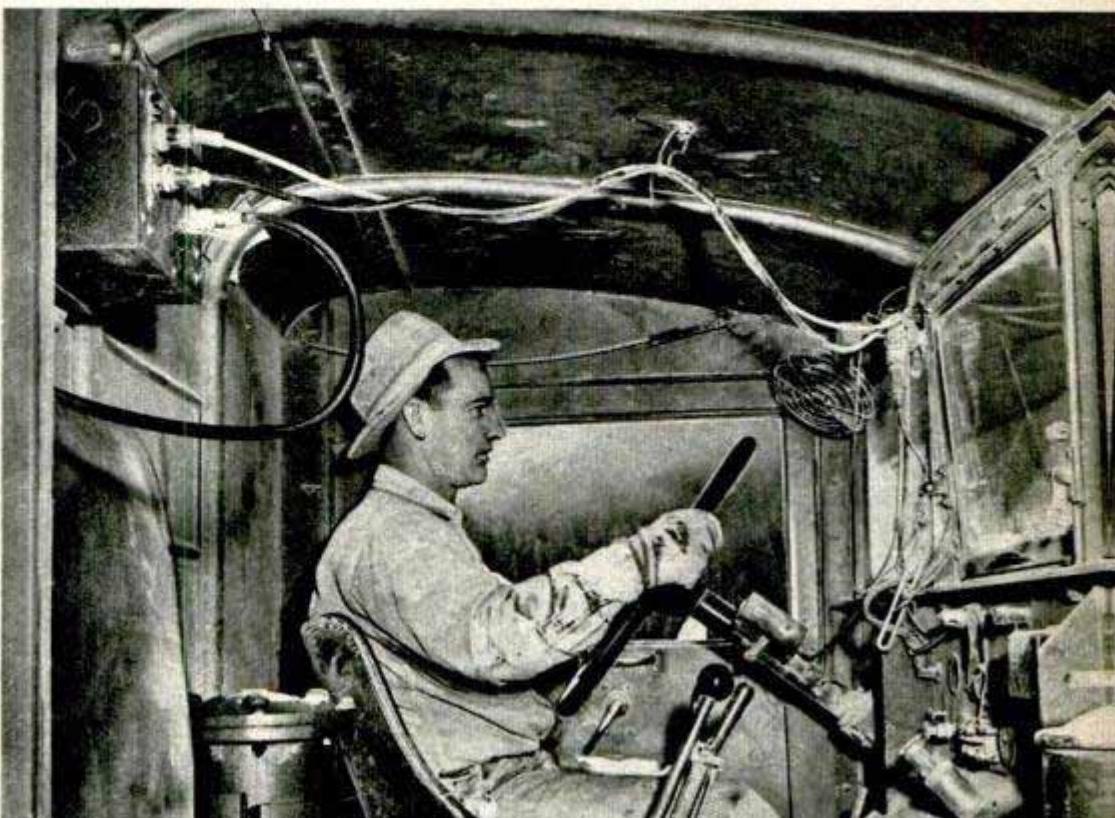
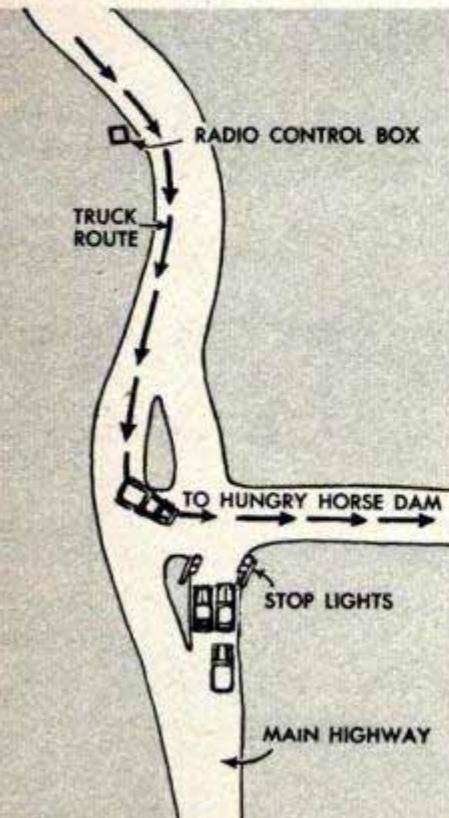
Left, checking the radio in control box. Right, truck rolls past the box, "ordering" stop light to turn green

TRUCKS ALWAYS GET THE GREEN LIGHT

MAMMOTH trucks hauling cement to Hungry Horse Dam in Montana have an "extra" that makes every motorist envious—a radio control that turns traffic lights green. To enter the road leading to the dam, the trucks have to make a left-hand turn across a busy highway at the foot of a downgrade. As a safety measure, the Bureau of Reclamation equipped the trucks

with a radio-signaling set actuated by a push button in the cab. A signal box alongside the highway, picks up the radio signal as the truck goes past. This operates a relay, turning the traffic lights red to stop approaching traffic at the intersection so the truck can make a left turn safely, after which a time-delay relay returns the lights to normal operation.

Left, truck route across highway. Right, control button is on steering column. Radio is seen at top left





I am the owner of a 1950 Nash Rambler. Body Style 3021 Convertible
Overdrive? Yes No Have owned it about 5 months. Mileage is now 2771 miles.
My approximate gas mileage in the city is 27 MPG. Country driving 30 MPG.

Do you have to use premium gasoline to eliminate knocking? No Do you change or add oil?
Crankcase 1000 mi. 4-6

If you add oil, about how many miles do you drive before adding one quart? 1000

How does the car handle on the road? EXCELLENTLY

What about maneuverability? EXCELLENT

What is your opinion of the 100 inch wheelbase? Adequate

Do you have good passing pickup at cruising speed? Very Good

Do you have sufficient curb and road clearance? Yes

What features about the car do you like? Pickup, visibility, maneuverability, economy, and appearance

Do you like the Nash Airflyte construction? Very Much

Do you dislike about the car? Lack of Trunk Space

What do you dislike about the car? Yes If so, how many? One

Have you ever owned a Nash car before? Yes If so, how many? One

Would you buy another Nash car? Yes Do you secure good dealer service? Very

Would you rate the Rambler? Excellent Good Average Poor.

How would you rate the Rambler? Excellent Good Average Poor.

What type of engine would you prefer in your car of the future? In-line V-type
Cylinders: 4, 6 or 8 Valves: Side Overhead.

Automatic Transmission? Yes If so, what type do you prefer? Hyp-o-Matic

Do you like the new low pressure super-cushion tires? No If more pressure, how much more? 4 lbs.

Do you carry recommended pressure? No If more pressure, how much more? 4 lbs.

You are under no obligation and your reply will be held in strict confidence.

My name is [Redacted]

Address [Redacted]

City and State Raleigh, N.C.

(Use other side for additional remarks if you wish.)

Clymer towers over
59½-inch-high Nash
Rambler. Left, typical
questionnaire filled
out in nationwide survey
conducted by PM

The true test of an automobile begins when the owner takes the wheel. To find out what the owners think, Popular Mechanics asked Floyd Clymer to make a survey of 1000 drivers and report their findings to you.

Floyd Clymer grew up with the automobile. At the age of 11 he was a dealer for Reo, Maxwell and Cadillac cars at Berthoud, Colo. In the years since, he has conducted hundreds of tests and surveys of all makes and is regarded as one of the world's foremost automotive authorities, having written and published some 60 books in the automobile field.

Here is his report of the first Popular Mechanics Motor Survey—



THE OWNERS REPORT on The Nash Rambler

By Floyd Clymer

WHO IS THE BEST JUDGE of a car? Is it the engineers who sweated it out on a drawing board and helped build it? Or is it the test drivers who have watched its growing pains and driven it thousands of miles on the company track? Or the expert who takes the car out for a few miles on the road?

These were the questions that bounced back and forth in a recent editorial conference at *Popular Mechanics* offices in Chicago. As a so-called expert I had been invited to attend the conference.

The engineers and test drivers were voted down as prejudiced. The expert—just about here is where I took a beating at the conference. I had happened to mention that I had picked up a new Nash Rambler in Kenosha, Wis., and was en route to my home in Los Angeles. For years I

have tested new cars and written more books than I care to remember on the subject of automobiles.

"This little Nash is a pretty sweet car," I told them, "and I wouldn't mind doing an article for you on the test."

The editors gave me assorted disparaging looks and one of them spoke for the group: "That would be just one man's opinion and we wouldn't be interested. The woods are full of automotive experts and their opinions after driving a car a few hundred miles. What we would be interested in is a real survey by the people who really know the answers—the men and women who own and drive the cars day after day under all conditions."

"That would really tell the story," I agreed, "but what a whale of a job—polling hundreds of owners."

In his own test of Rambler, Clymer takes curve on Pikes Peak near 14-mile post, elevation 12,000 feet



RESULTS OF THE POPULAR MECHANICS SURVEY OF NASH RAMBLER OWNERS

(Percentages From Poll)

Owners who bought overdrive.....	36%
Average gasoline mileage (in country)	27.4 m.p.g.
Average gasoline mileage (in city)	23.5 m.p.g.
Owners using regular gas.....	85%
Owners who change oil.....	79%
Average mileage for change of oil.....	1660
Owners who add oil.....	21%
Average mileage for adding oil.....	990
Owners who like 100-inch wheelbase.....	93%
Owners satisfied with road and curb clearance	95%
Approve of Airflyte (body and chassis welded into one unit) construction.....	97%
BEST LIKED FEATURES	
Maneuverability	92%
Economy	61%
Acceleration	58%
Style	46%
Seating comfort	36%
Convertible feature	28%
(These percentages are based on the fact that some owners commented on more than one feature)	
RATING OF CAR	
Excellent	60%
Good	29%
Average	10%
Poor	1%
GENERAL INFORMATION	
Prefer in-line engine.....	75%
Prefer V-8 engine	25%
Prefer six cylinders.....	69%
Prefer eight cylinders.....	29%
Prefer four cylinders.....	2%
Prefer automatic transmission.....	49%
Prefer Hydra-Matic	49%
(The above figure is 49% of the 49% pre- ferring automatic transmissions)	
Prefer makes other than Hydra-Matic.....	40%
Undecided about automatic transmissions	11%
Owners who like low-pressure tires.....	79%
Previous Nash owners.....	28%
Will buy another Nash.....	85%
Might buy another Nash.....	13%
Will not buy another Nash.....	2%
Dealer service good.....	76%
Dealer service average.....	19%
Dealer service poor.....	5%
Most disliked features— small trunk space, radio	



Well, it was a whale of a job, but the results are so satisfying it was well worth it. We learned a great deal more from the survey than I did from my trip west via Pikes Peak. In fact, I think we learned more about the car than the engineers at Nash could come up with themselves. We polled 1000 Rambler owners in 20 states. We discovered that 93 percent of the owners like the new 100-inch wheelbase and many other things that a prospective buyer or the public in general would like to know. Incidentally, it looks like short cars have a bright future.

Generally, the poll reports were studded with such remarks as this: "Wonderful car." "Every feature is perfect." "What do I like about it? Everything in general." "The Rambler is the only car we plan owning from now on." "No rattles, good motor, certainly good all-around car." "Smooth and easy to steer." "Seems to have plenty of power and I especially like all the accessories built in." "The Nash Airflyte construction is excellent. I have had a bad accident in this car; the heavy car that hit me is junk while the Nash held up very well."

An owner from Raleigh, N. C., wrote: "This automobile has been a source of a great deal of pleasant surprise to me. I am willing to be quoted as recommending this car unreservedly." (The mileage on his car was 9991 miles at the time of the survey.)

The survey wasn't all

bouquets either. There were brickbats here and there, and some so-called left-handed compliments like the man from Clear Lake, Iowa, who wrote at the conclusion of a long gripe about a howl in the rear end of the car: "Maybe I've a lemon, but it's still a fine car. (Speedometer shows 5800 miles.) I believe the Nash engineers are due much credit for the driving and riding qualities they've put into this short and light auto."

One thing the Rambler owners agree upon from coast to coast: Gas mileage of the car is tops. According to the polls the average gas mileage in the city is 23.5 miles per gallon and in the country 27.4 miles per gallon. Incidentally, 85 percent of the owners use regular gas and only 15 percent premium gas. Seventy-nine percent reported that they change oil at an average mileage of 1660 and the other 21 percent seldom change, adding oil at an average 990 miles.

The owners were loud (an understatement in some cases) in their disapproval of the small trunk and the radio. A man from De Soto, Mo., praised the car highly until he came to the line after the question "What do you dislike about the car?" He wrote: "I like everything about it except the small trunk, did I say trunk?"

In answer to the question "What features about the car do you like?" exactly 92 percent said maneuverability; 61 percent, economy; 58 percent, acceleration; 46 percent, style; 36 percent, seating comfort; 28 percent, convertible feature. (These figures are computed on more than one feature listed per owner to the question.) Sixty percent rated the Rambler generally as excellent, 29 percent said good, 10 percent said average and 1 percent said poor.

The Nash Airflyte construction (body and chassis welded into one solid unit) got a rousing vote of approval—97 percent. A very high owner satisfaction is indicated when 85 percent said they would again buy a Nash car. Thirteen percent said possibly and only two percent said they would not. Among the total reporting there were 28 percent previous Nash owners.

A man in Indianapolis, Ind., who owns a heavy car, bought a Rambler as a second car. Here is what he has to say about the small car's roadability:

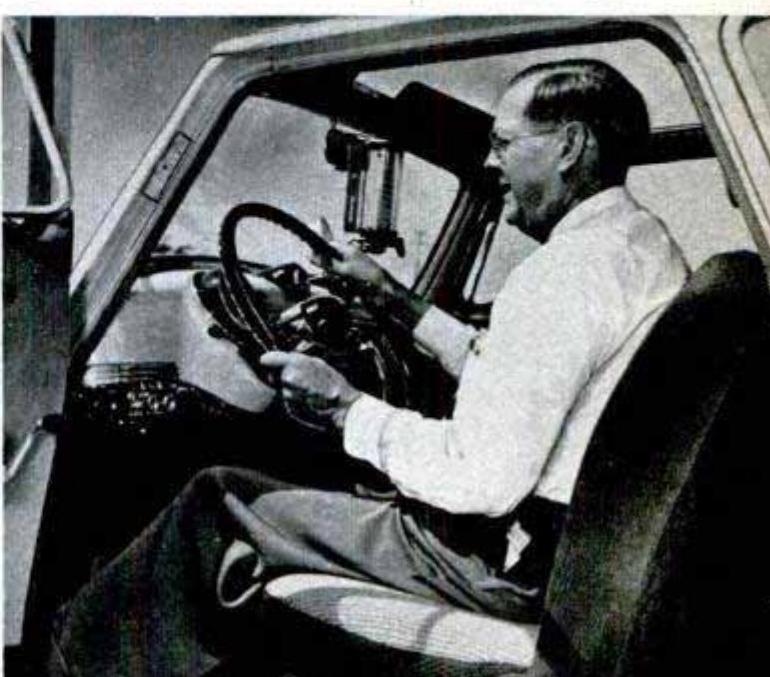
"I am tickled to death with it, and since buying it have driven my big car about 300 miles, as compared with 2000 for the Nash. We have taken a few week-end trips averaging 200 to 300 miles and find, in spite of the short wheelbase, we do not tire. In fact, I am inclined to believe that it is less strain on the driver than the



Rambler's power-packed L-head engine has a very high horsepower-to-weight ratio affording economy, speed



Small trunk space squeezed back by top mechanism got most kicks in owner survey. Below, Clymer (just one inch under six feet) demonstrates the Rambler's ample leg room and comfortable driving position for big man



1951 RAMBLER SPECIFICATIONS

ENGINE

6-cyl. "L" head. 3½-in. bore, 3¾-in. stroke. Displacement — 172.6 in. Brake H.P. — 82. Compression Ratio — 7.25:1. Transmission — 3-speed conventional. O.D. optional.

GENERAL

Weight — 2480 lbs. Wheelbase — 100 in. Tread-front 53½ in., rear 52 in. Height — 59¾ in. Over-all Width — 73½ in. Length — 176 in. Tires — 5.90 x 15. Recommended Pressure — 24 lbs. Road Clearance — 7¾ in. Turning Radius — 18 ft. 6 in. Steering Wheel, lock to lock — 3½ turns. Steering Ratio — 20.4:1.

CAPACITIES

Oil, 5 qts. Water, 12 qts. Gasoline, 20 gal.



J. J. Gogola of Nash Motors explains push-button operation of top on sturdy side rails to Clymer at wheel

larger car. I never realized that riding qualities such as this car has could be built into the 100-inch wheelbase."

There were a number of complaints about the convertible-top mechanism and, surprisingly, many were tolerant, adding that Nash would undoubtedly try to improve the top. An owner in East Hartford, Conn., reported: "We have one of the first Ramblers sold and have had a noisy front end and bad top mechanism, but they have been replaced by the factory. The radio is lousy and supposed to be a custom job. We find we get the best gas mileage from 45 to 55 miles per hour. [I disagree—with overdrive my best gasoline mileage was 31.9 at a constant 30 miles per hour.] The trunk is

too small to be of much use. Paint is very good. We can beat the pants off any car made in America at the stop light for the first block. The car can't be beat for city driving, except for the large turning radius which makes for not too easy parking." (He is mistaken about the latter. The Rambler parks easily and its turning radius is shorter than any U. S. car except the Henry J and Crosley.)

There was some difference of opinion on cruising speed. While some said "only fair" and "not too hot," others were high in their praise. (I agree with the latter.) A man from Fort Riley, Kans., reported: "The Rambler is plenty fast and easy to handle. I have had it on 100 miles per hour several

Ready to start gas-mileage survey with miles-per-gallon gauge, Clymer uses an Audograph recorder for notes





Cog-road passengers on the summit of Pikes Peak gather around Rambler to question Clymer about the car

times. Plenty of pep, easy parking, easy driving on any kind of roads." A few thought the car too hard to get in and out of and several complained that the doors were too heavy (I agree). One owner said they were a menace to children. There were one or two kicks about vibration at high speeds, and one man in the thousand objected to the position of the battery.

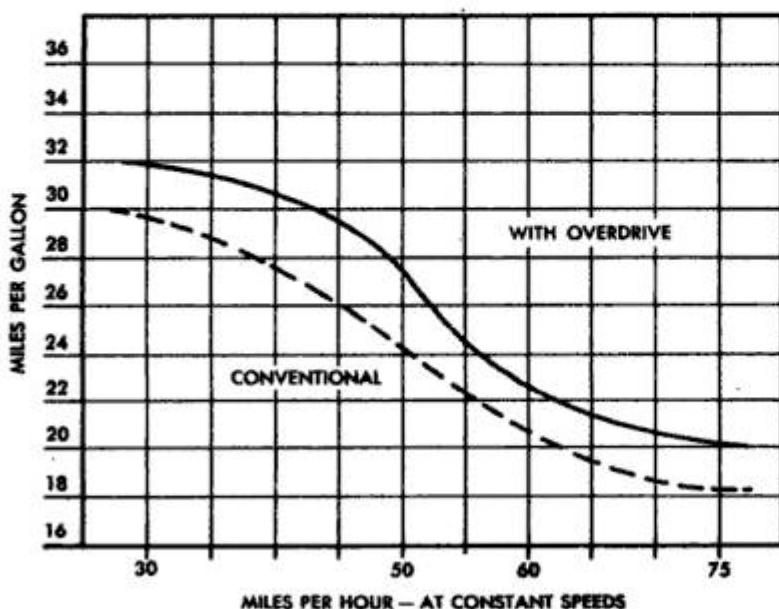
On the humorous side, one owner was intrigued with the inside lighting of the car (electric!). One enthusiastic owner who could find no defects revealed that he had owned his car three months and driven the car 23 miles. Another reported that the emergency-brake handle went up his trouser leg every time he got in the car. A Californian wrote: "What I like is that I can easily push the car by hand with little

effort, which means if I ever run out of gas on level road I can easily push it two or three miles without getting very tired." The car weighs 2480 pounds. Another said he liked the leg room and believed that a Rambler owner can put his legs in twice as many different positions as the driver of a Cadillac.

We were interested to learn that 75 percent of the Rambler drivers want in-line engines in their cars of the future; that 69 percent want six-cylinder engines, 29 percent want eight and only 2 percent want four; only 49 percent want automatic transmissions and that 79 percent like the new low-pressure tires although 39 percent overinflate them an average of 3.03 lbs. per tire.

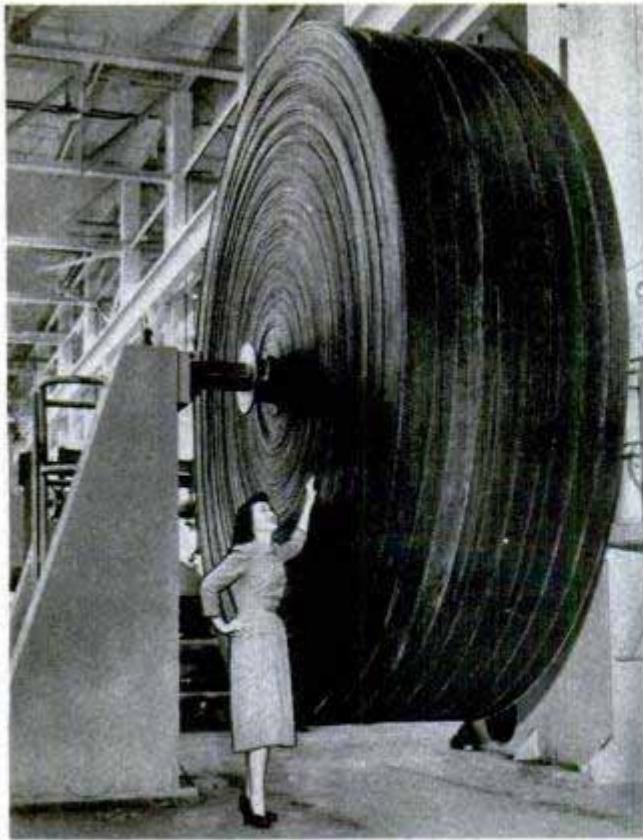
(Continued to page 258)

CLYMER'S ECONOMY TEST OF THE RAMBLER



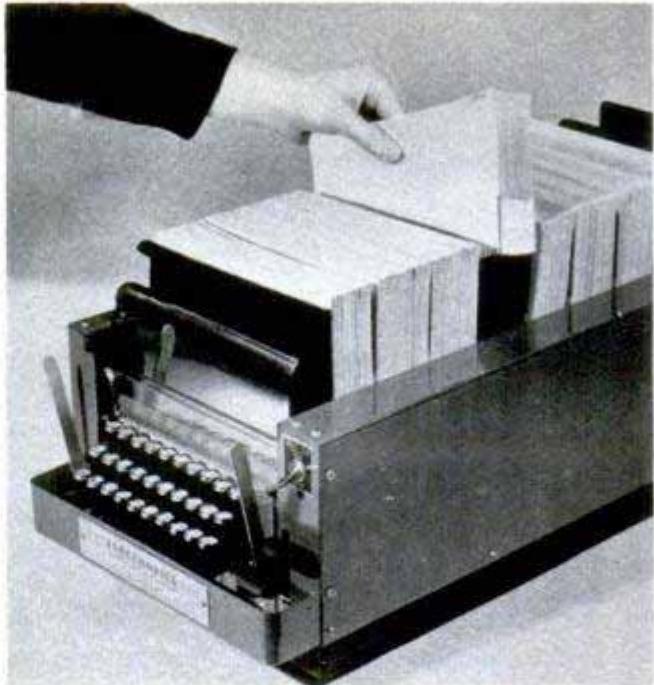
Miles Per Gallon	O.D.	Conv.
At constant 30 m.p.h.	31.90	29.75
At constant 50 m.p.h.	27.45	24.30
At constant 60 m.p.h.	22.40	20.75
At constant 75 m.p.h.	20.12	18.10

Mileage After Car Was Broken In	
Climbing Pikes Peak (mostly second and low gear)	11.40
Pikes Peak, Colo., to Gallup, N. Mex. through Rocky Mountains, over Continental Divide	22.90
Gallup to Los Angeles.....	26.45



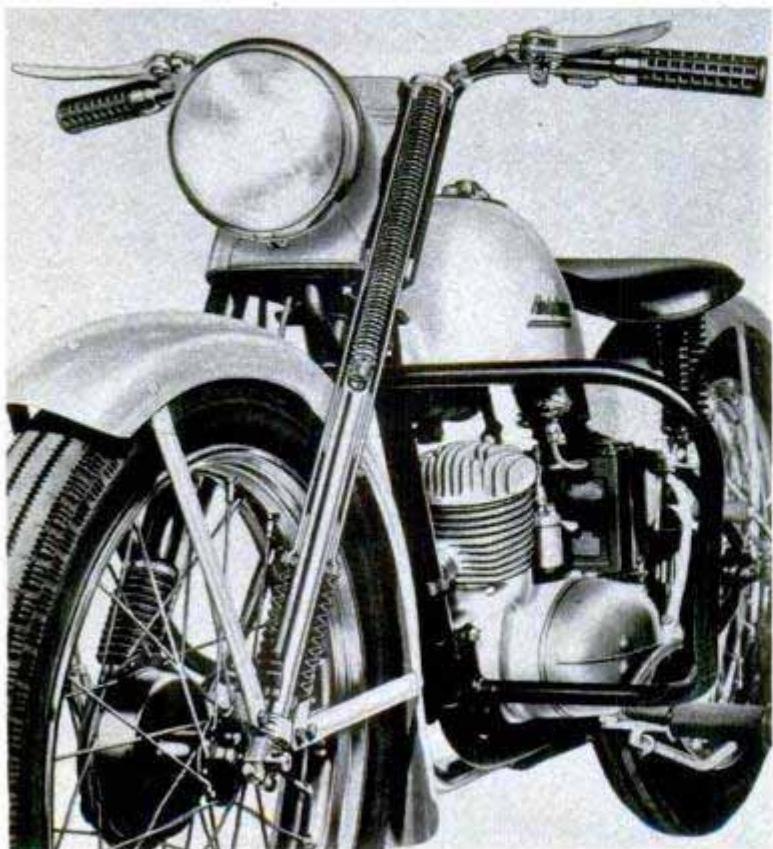
Big Belt

Built to speed unloading of ore boats on a Baltimore dock, a huge conveyor belt is described by the manufacturer as the "largest roll of conveyor belting ever built without splicing." The 48-inch-wide belt makes a roll that stands 15 feet high and weighs 45,000 pounds. It was the first major product from the new B. F. Goodrich belting plant in Akron, Ohio.



Pop-Up Electric File

You can drop one or 100 cards in a new electric file without regard to sequence, then find any desired card on a moment's notice. Cards can't be misfiled because they aren't filed according to system. Each card is "coded" with letters or numbers and, when a particular card is desired, its code designation is "typed" on a keyboard. Pressing an operating key causes the card to pop up in the file where it stays until it is withdrawn. For cards covering a general classification, the code is "typed" and all the cards on that subject are pushed up in the file.

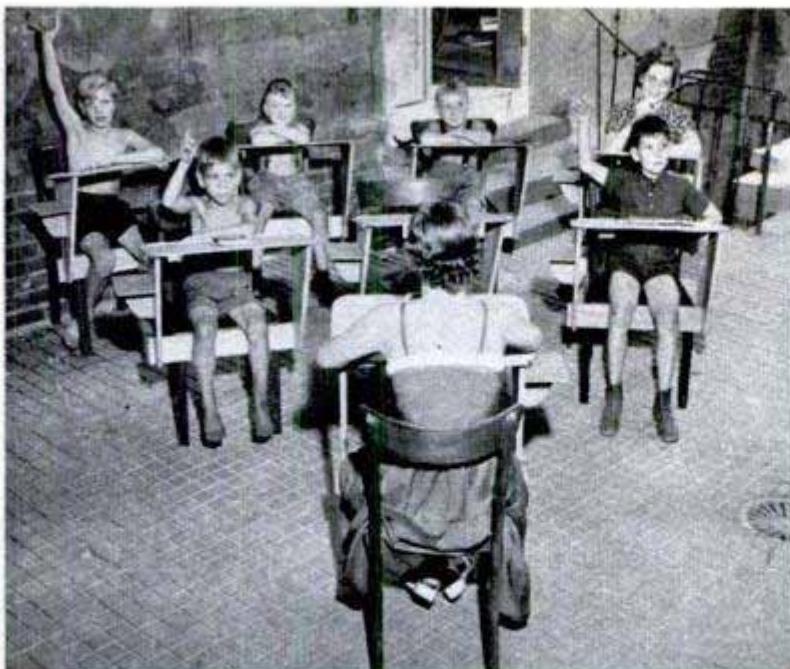


Sliding Fork for Motorcycle

Road bumps are smoothed by the action of a telescoping fork on a lightweight motorcycle. A heavy cylinder slides inside a greased tube to absorb the shock of a bump. Atop the cylinder is a coil spring which maintains the correct pressure on the cylinder. Pleated fork boots made of Neoprene protect the lubricated slider from dust.

Uranium-Poisoning Antidote

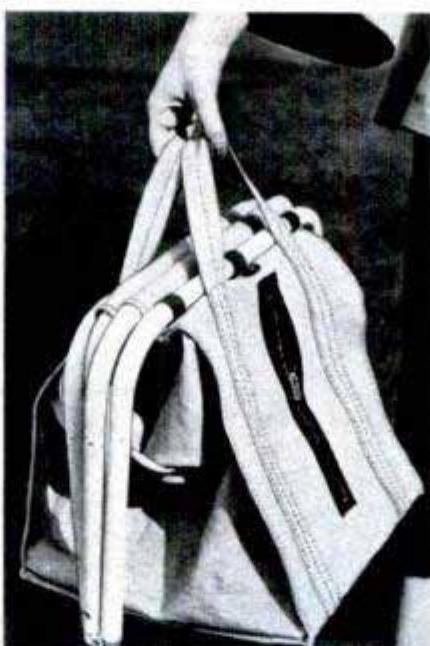
What may be an antidote for uranium poisoning has been discovered at the University of Rochester. It is a chemical that is called polyphosphate. In three-week experiments with albino rats, 10 out of 25 died when fed a uranium-containing diet. Another 25 were put on the same diet, but given polyphosphate injections, and all of the latter survived.



Folding Top Converts Straight-Back Chair Into Desk

Ordinary straight-back chairs can be converted into school desks by clamping a working surface to the seat. The desk top,

invented by a German, folds up when not in use. Chairs equipped with the tops can also be used as temporary seats.



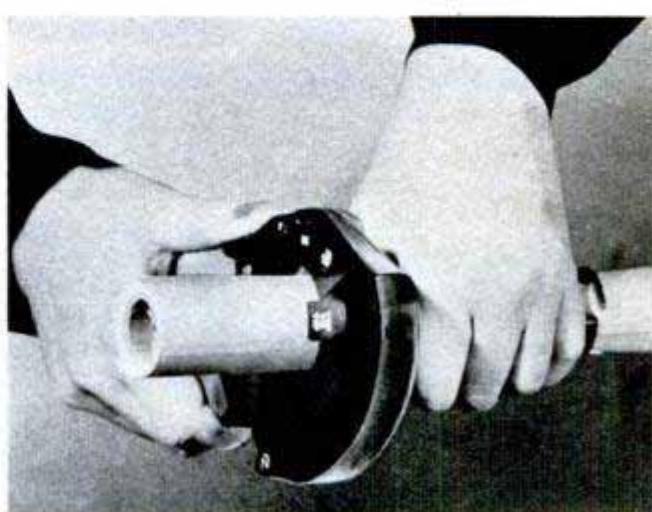
Surprising Handbag Becomes a Chair

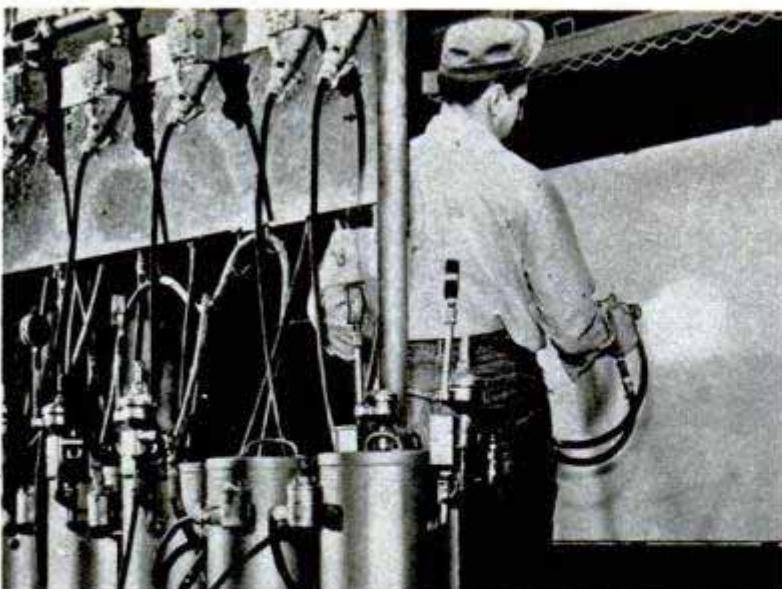
There's a new surprise awaiting the husband who is amazed over the quantity of diverse items his wife can carry in her handbag. This time it's a handbag that converts into a comfortable chair. The bag, which was developed in England, is made of canvas and has a tubular-steel frame which unfolds to form the legs of the seat. And, used as seat or handbag, it still holds all milady's knickknacks, with room to spare.

Window-Shade Cutter

Window shades, fiber or plastic, are cut accurately on the roller by a hand-operated cutter. Squeezing the handles of the cutter forces the blade into the material. When the shade is rotated this makes a neat cut. In the case of shades mounted on wood rollers, the shade is cut and the roller sawed off separately. Since there are no exposed blades on the cutter, the device cannot cut the hands.

Plans are under way to build a 1080-mile crude-oil pipe line from Wyoming to the Wood River refinery area in Illinois.



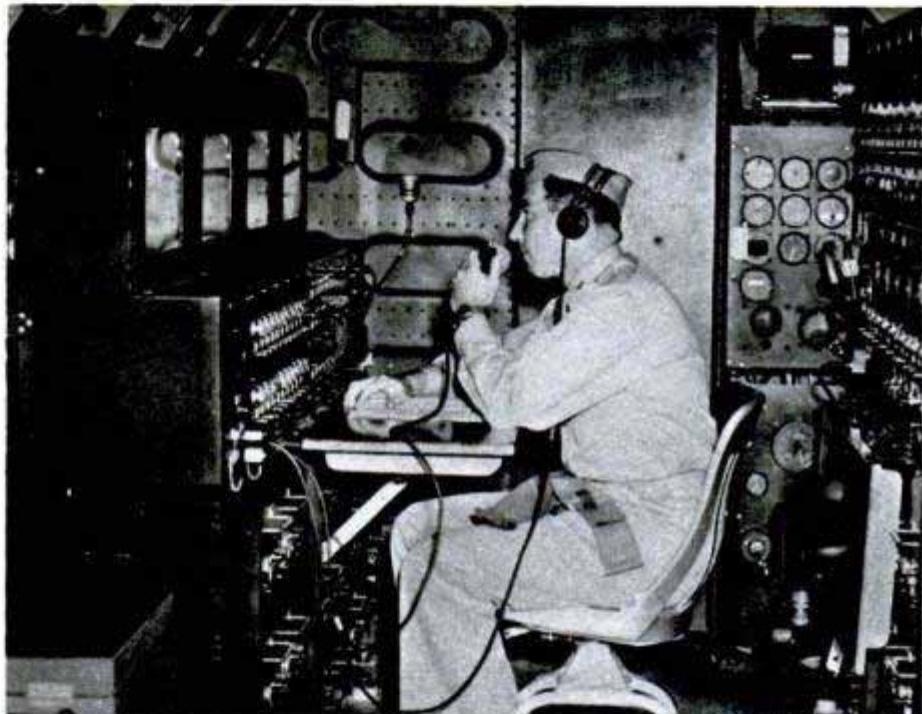


Paint Heater for Spray Gun

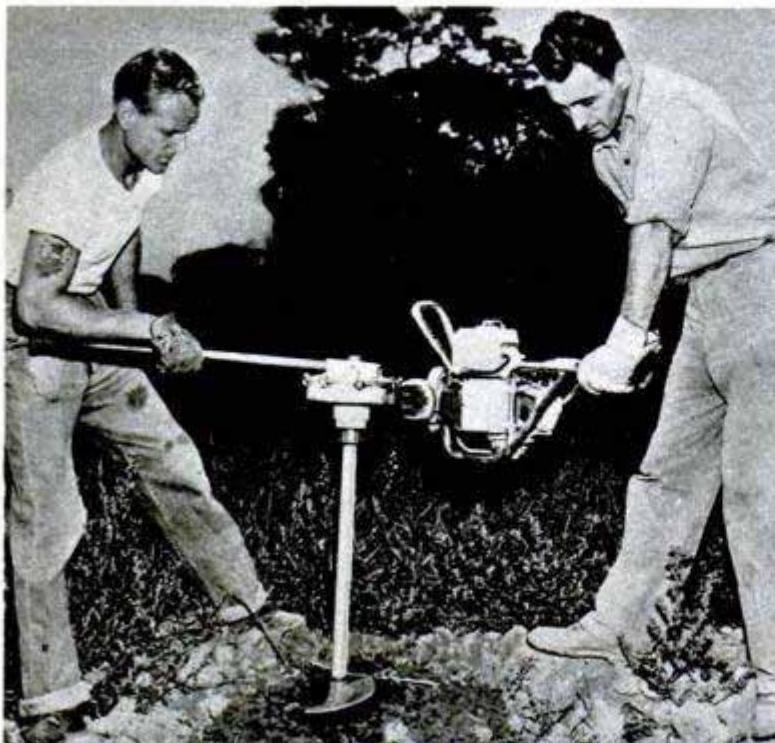
Hot paint, heated to about 200 degrees before it leaves the spray gun, requires less thinner and produces a heavier, more uniform film. In many cases, because more solids are sprayed, one coat covers as well as two coats of cold spray. The heater is electrically operated and raises the temperature of both paint and air a thermostatically controlled amount. It also saves paint by operating at lower pressures, thus reducing overspray. Because there is less thinner in the paint, it is faster drying. The unit heats in 15 minutes.

Pilot Tester

With electronic devices doing the scoring, the Air Force is learning how quickly its pilots react to flight problems. The testing records how accurately a flyer maintains heading, altitude, air speed and other variables, with an electric clock stopping whenever he exceeds allowed tolerances in any category. The time the clock operates, compared with the total test time, indicates his degree of piloting proficiency. A voice recorder and camera register his comments and body movements.



U. S. Air Force photo



Dirt Drill

In less than 15 seconds a new gasoline-powered earth drill can dig a posthole 30 inches deep. The drill's five-horsepower engine has a swivel coupling which makes it possible to drill a hole at any angle, and permits reverse rotation of the auger. Complete with a six-inch auger, the drill weighs 79 pounds and has a centrifugal clutch that disengages the auger at idling speed. Augers of 9 and 12-inch diameters are also available.

Information not listed on articles in the index, starting on page 14, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

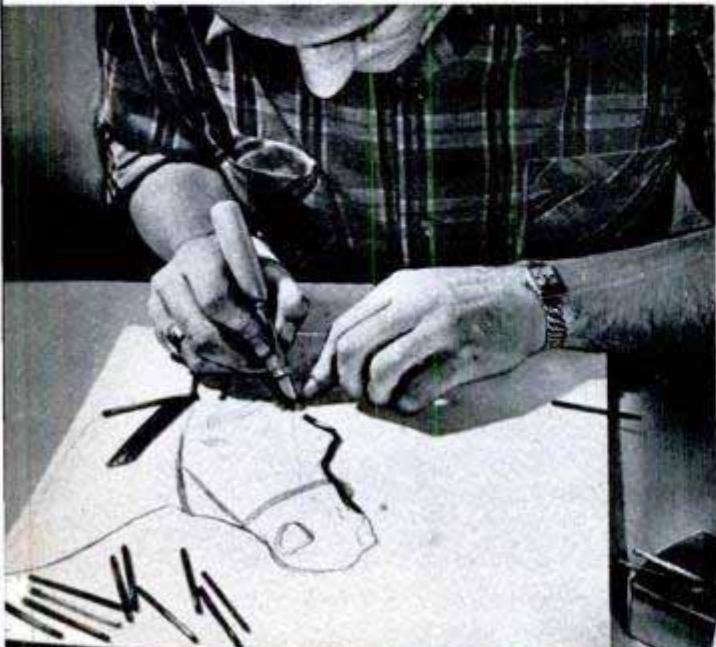


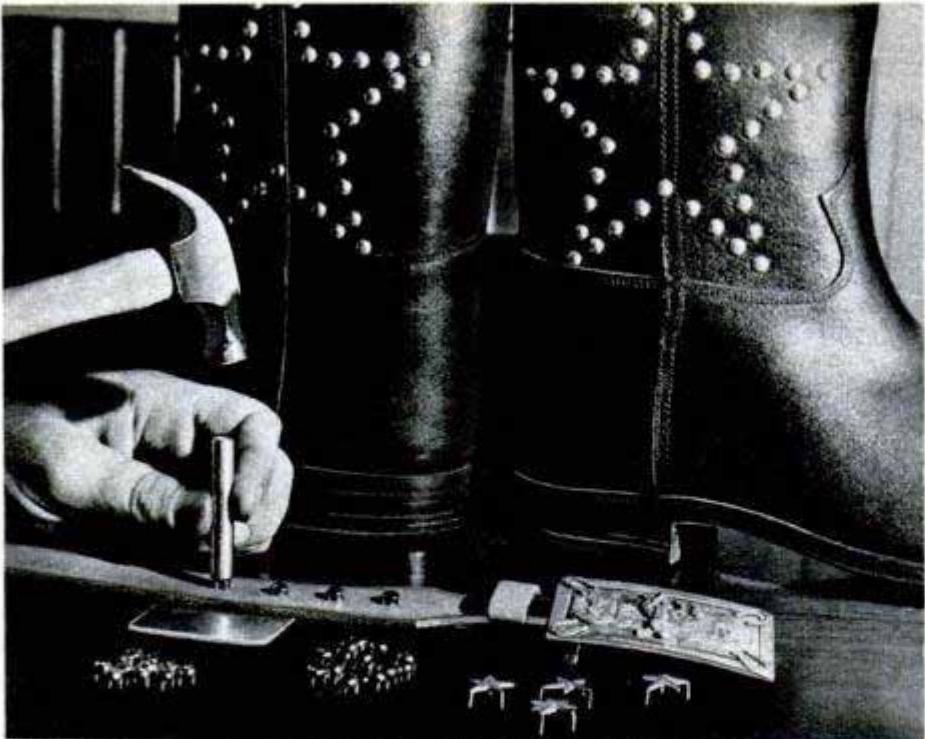
PICTURES FROM BURNED MATCHES

Portraits, animal pictures and models are made with specially burned matches

MAKING pictures out of burned matches is the hobby of Kevin Anderson of Los Angeles. He also makes airplane and ship models. Anderson does not use ordinary burned matches for his hobby; the matches are specially burned. He lights the kitchen matches in their box and lets them smolder out with the cover closed. He bends them to fit an outline made on cardboard and fastens them in place with casein glue. When the glue dries, the matches are sandpapered lightly to remove any burned parts. Third-dimension effect is gained by sandpapering heavier in some spots. For coloring, he uses water colors or crayons. In his spare time, he can make a picture in about six weeks.

Below, singed matches are glued to the outline sketched on cardboard. Right, one of Kevin's matchstick masterpieces. Below, right, working with model of a ship made by fastening matches to frame



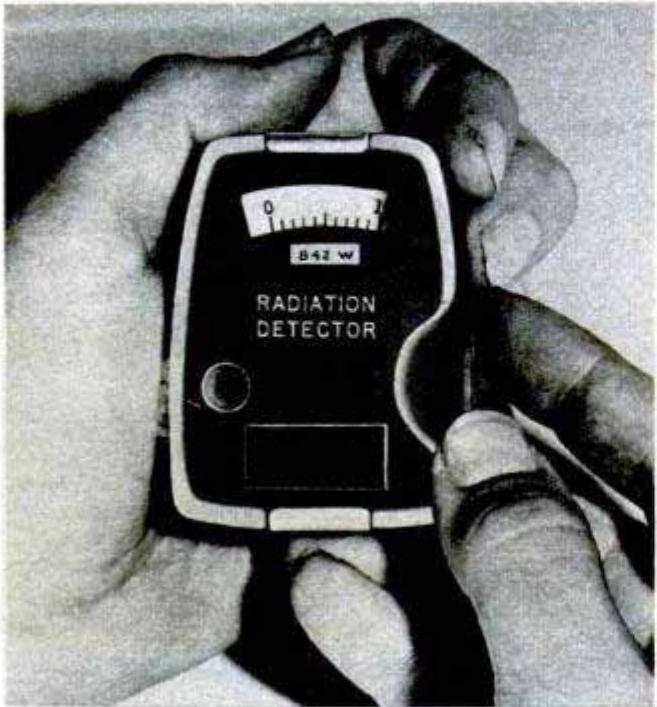


Rivets for Clothes

You can trim hats or boots, belts or handbags with a new kit that includes stainless rivets, a setting tool and an anvil plate. The rivets are pressed into the material with the thumb, then tapped home with a light hammer and the rivet set. This clinches the rivet's prongs on the underside of the material. The rivets can be used on any kind of cloth or leather, and may also be installed as gliders on the corners of camera cases and other small boxes. The kit also contains decorative gold-colored stars.

Radiation Detector

Dangerous amounts of radioactivity can be measured by a pocket-size radiation detector that will be on the market next year. Now being manufactured for the Atomic Energy Commission, the inexpensive, simple instrument will be offered to the public when the present AEC contract is completed. It was developed by Drs. C. C. and Thomas Lauritsen of the California Institute of Technology and operates on the principle of the electroscope. The instrument is mounted in an airtight plastic case and is equipped with a knob by which its static charge may be renewed. The rate at which the charge dissipates, shown on a scale, indicates the amount of radiation present.



Stainless-Steel TV Tube

Larger rectangular pictures in television sets will result from the development of a new stainless-steel tube that has a heat-expansion rate practically the same as glass. The expansion rates have to be almost identical because the glass screen and metal tube must expand and contract together. The new steel is an alloy containing 17 percent chromium.

Single-Unit Electronic Flash

Designed specifically for the amateur photographer, a compact electronic flash unit cuts the cost of flash pictures down to less than a cent a shot. Dry-cell batteries provide the power for the lightweight unit. The tube is guaranteed for 10,000 flashes. Priced low enough to be attractive to the hobbyist, the unit can be used with any camera.



Springy-legged Jim Pollard of Minneapolis scores a lay-up shot. Six feet five, he can touch an object 12 feet above the floor

Basketball

By Aubrey O. Cookman, Jr.

A GAME is changing our concept of human size.

One of basketball's top coaches is complaining that his team lacks a tall player. The biggest man he has is only six feet five inches, a mere dwarf among the giants of today's high-speed, high-scoring cage sport.

An attendance of over 100,000,-000 at games last season, a new record, indicates it is still growing as the number-one U. S. spectator sport. But has the emphasis on height eliminated skill from the game and made it an athletic sideshow of awkward, ungainly giants?

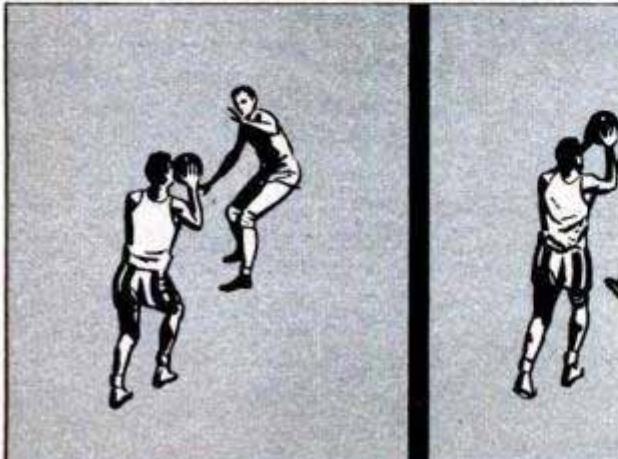
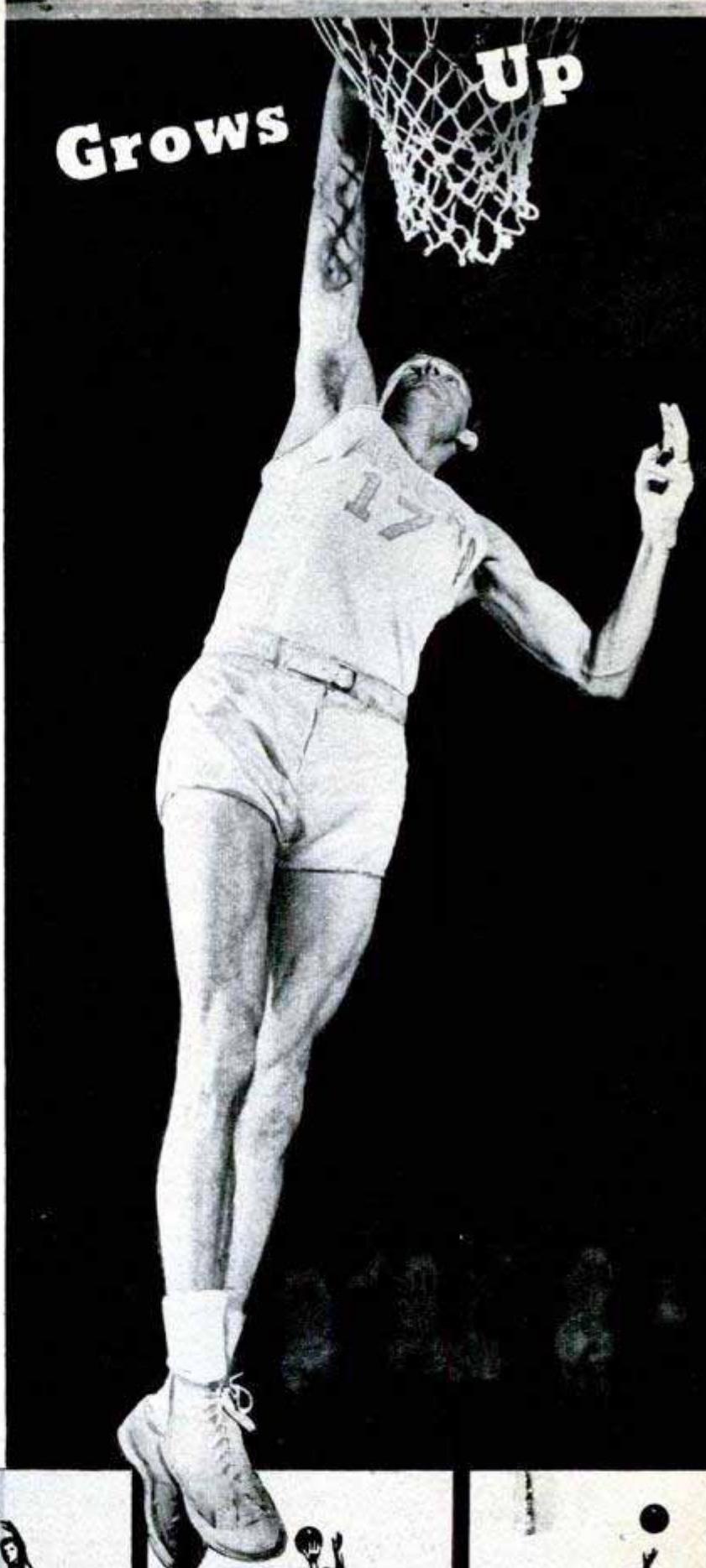
For an answer we went to "Mr. Basketball"—George Mikan of the Minneapolis Lakers professional team, voted the greatest basketball player of the last 50 years in a nationwide poll of sports writers and broadcasters.

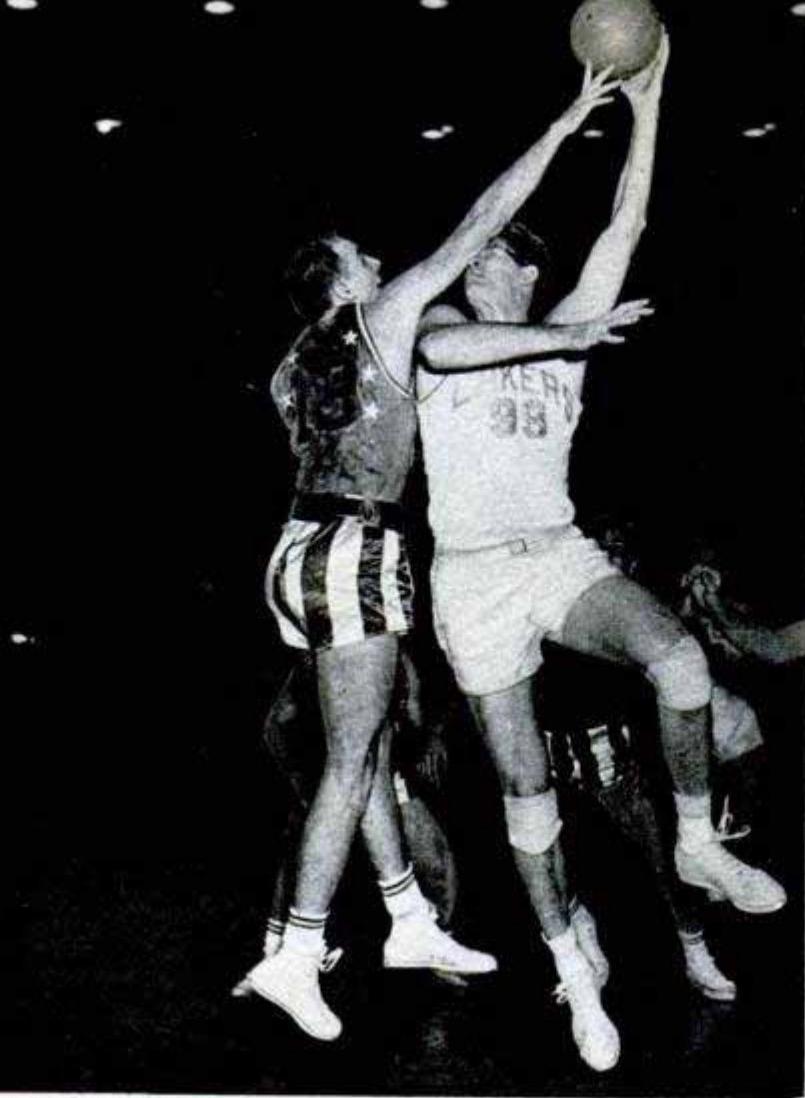
"Hurt the game? Just the opposite. The increasing number of big men in basketball has made the 'little' players—under five feet ten inches—work harder and improve to keep pace.

"To survive in high-grade competition, against taller men, they had to sharpen their shooting, ball

Shots with either hand, more difficult to guard against than the older two-handed style, help account for the increasingly large scores in present-day basketball

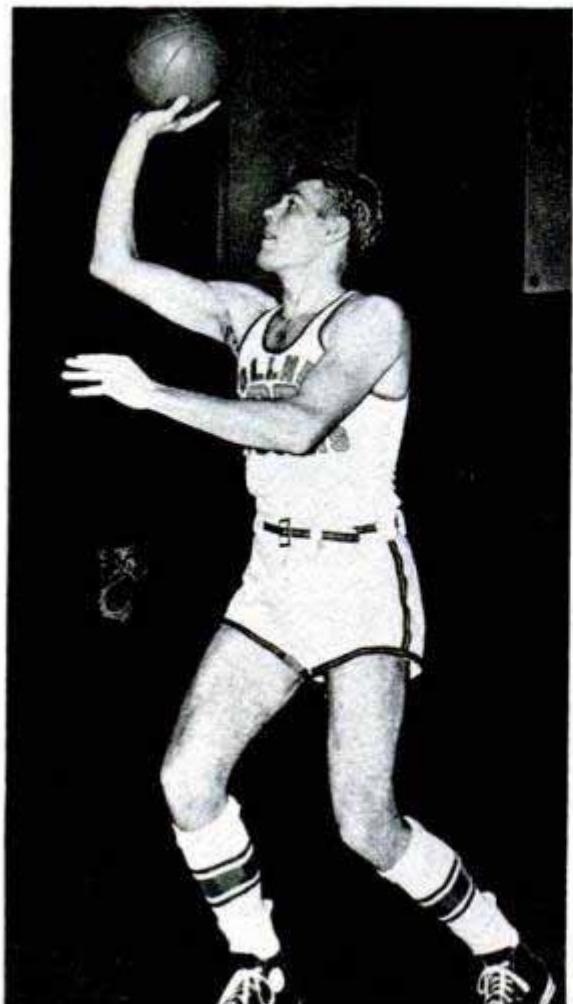
GROWS UP





Chicago Herald-American photo

In annual game against College All-Stars in Chicago, George Mikan leaps and stretches to make a one-handed shot. He scored 31 points



hand above our basket and slap away some potential goals. The next season's rules book added a phrase forbidding players from interfering with the ball 'on its downward flight to the basket.'

"As far as playing advantages were concerned, those rules changes chopped down the size of the big boys. They had to learn to move around, fast, and to develop the stamina to race back and forth between their own and their opponent's basket whenever the ball changed hands. If they didn't, the smaller men would literally run them out of the game. That happened to some of them.

"The way I see it, the 'big man, little man' rivalry has brought much more skill, speed and shooting accuracy to basketball. Not only is there about twice as much shooting, but college-game

Right, Mikan has a simple, effortless free-throwing style. His feet are parallel and approximately 14 inches apart. He keeps his trunk almost perpendicular and bends the knees as the ball is lowered and then lifted upward

Ward Williams of Ft. Wayne professional team illustrates good balance for a short push shot

handling and defensive abilities. I don't think we'll ever see good little men doomed as basketball players.

"Fifteen or 20 years ago a fellow over six foot two was looked on almost as a freak in the game. He could be clumsy and a mediocre shooter, just as long as he could outreach the opposing center on the tip-off. That was almost his sole responsibility. Height was about 95 percent of the reason he was even on the squad.

"Finally the balance began to swing against the height advantage of the human skyscrapers. Their specialty, the center jump, was eliminated. Likewise, tall men had capitalized on techniques of camping in front of the basket for passes tossed to them by their smaller teammates, then turning and dropping the ball through the hoop. The rules makers abruptly stopped their fun by limiting the time a player could remain in the circle in front of the basket to three seconds.

"They even spoiled a little maneuver I had used with some success against the University of Kentucky's great team in 1942. With my six feet ten inches and a jump, I could get my



statistics for the last decade show today's player misses less often. Scores have multiplied from totals like 21 to 18 in the old days to those like the 76 to 70 margin by which we snapped the Harlem Globetrotters' 113-game winning streak last year. Apparently the fans, and nearly 22,000 turned out for that game and over a half million saw us during the season, like the faster game."

Mikan is big, six feet ten inches and 240 pounds, but that only partially explains his success. Jim Pollard of his own team, who has bruised his elbows against the basket rim—10 feet above the floor—can outjump him. But coaches and critics agree Mikan would be great even with average size. Ray Meyer of DePaul University in Chicago calls him the most intelligent player he ever coached.

He didn't take up basketball seriously until he got to college. At first he was distinguished there for his size, awkwardness and tremendous desire to improve. Coach Meyer admits now that "Big George" had little native cage ability. One of his early faults was a tendency to pivot from, instead of toward, the basket. Meyer put folding chairs on either side of Mikan in practice. After a few knee-banging experiences, he learned to pivot properly.

The coach made him skip rope for 15-minute periods to loosen his leg muscles, then take 15 minutes each at alternate left and right-hand shots and tip-ins under the basket. To improve his speed and quickness, Mikan was pitted in practice against a short player, the fastest man on the team.

Coach Meyer would patiently rerun game movies to show George his mistakes. The effort paid off, and by the time Mikan graduated he'd twice been named to the All-American team, averaged over 19 points a game and scored 53 points in a single tournament contest in New York's Madison Square Garden against Rhode Island, one of the strongest teams in the nation.

All this hard work and careful coaching has made Mikan an exceptional student and analyst of basketball.

For free-throw shooting he has settled on an effortless, two-handed underhand

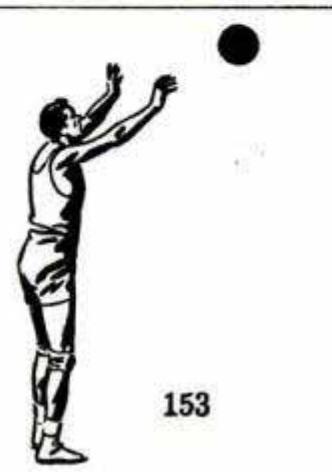


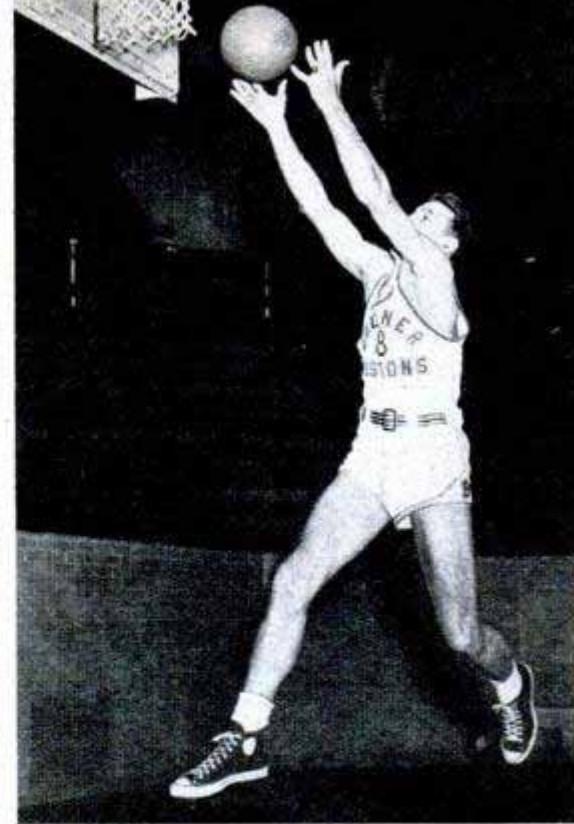
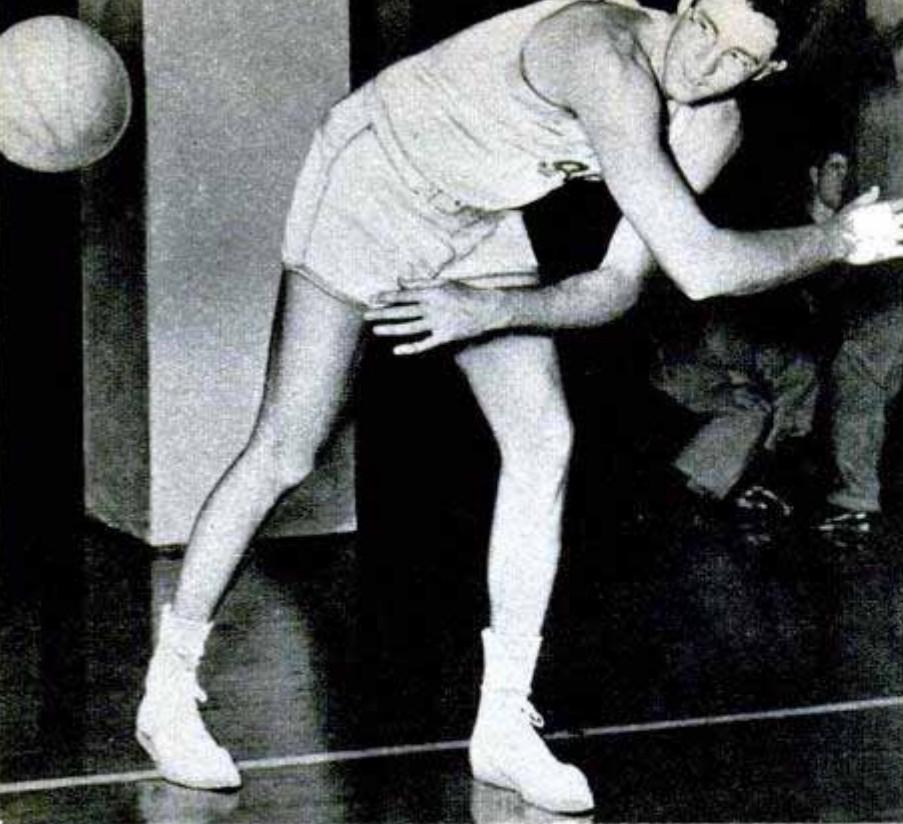
Although outmoded as a spectacular one-man offensive weapon, dribbling is still vital in modern game

throw. There is no wasted motion. At its start both arms are extended, on a direct line with the basket rim, with the feet parallel and about 14 inches apart, toes pointed out. As his arms—still extended—drop downward his trunk remains almost perpendicular and his knees bend.

The ball is between his legs when the upward arc starts, arms still outstretched, and he follows completely through after releasing the ball. Like most high scorers, Mikan is frequently fouled and he is accurate enough to score better than 70 percent of his free throws, well above the average.

On goal attempts more than 18 feet from the basket, the big Minneapolis star favors a two-handed set shot. The fingers and thumbs are spread and toward the back of the ball, holding it just ahead and slightly higher than the chest. His feet are 12 to





Mikan flips a short, underhand pass. Though the two-handed lay-up shot, right, gives the player slightly better control of the ball, he can't get up as high in using it as he can when attempting a one-handed shot

18 inches apart, with one about six to eight inches ahead of the other, affording good balance. Mikan aims for the front part of the basket rim, a less confusing target than the basket backboard.

Closer in than 18 feet, Mikan and virtually all the other stars now use a one-hand push shot, usually attempted when the player is running or jumping. It is much harder to block than a set shot, where the player is at least momentarily immobilized.

An effective variation is the one-hand hook shot perfected by Tony Lavelli, former Yale University and present professional star. Lavelli swings either his right or left outstretched arm in a wide arc, releasing the ball as his hand reaches its highest point. He also shoots free throws with one hand.

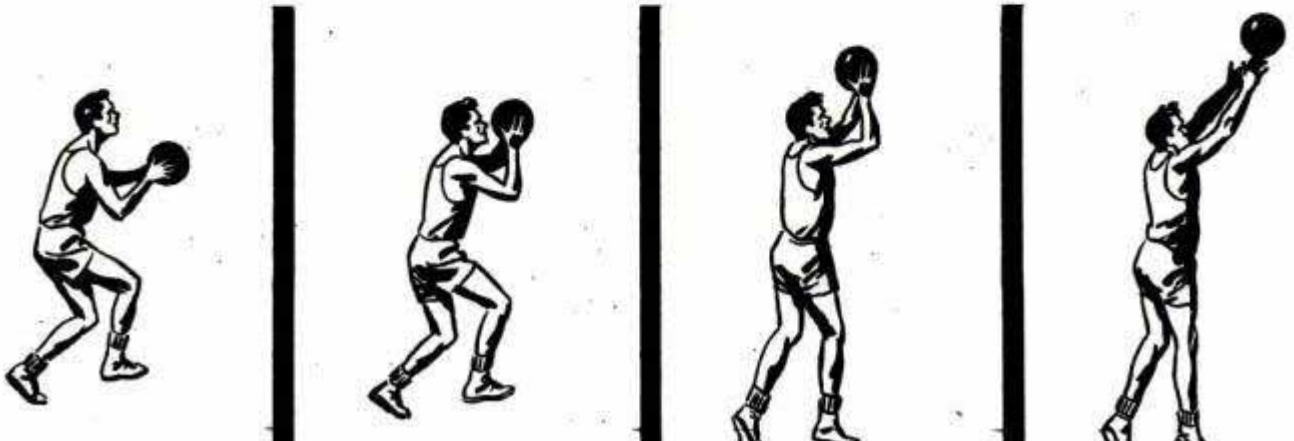
In contrast to the game's greatly increased speed and the growing popularity of one-handed shooting, dribbling and passing techniques are little changed. Top-flight players crouch over the ball to pro-

tect it when dribbling and push—not slap—the ball downward, with the outstretched fingers. They dribble low, below waist level, but bounce the ball higher when dribbling fast and momentarily unchecked by the opposition.

Of special interest to those budding athletes who are reluctant to take time away from basketball to practice the piano is one of Mikan's theories. He believes that six years of piano study as a youngster, enough to earn a conservatory degree, greatly improved the deftness and strength of his fingers, an important asset in all kinds of ball games.

Playing professional basketball while completing his legal education, Mikan has lead Minneapolis to three straight world championships and averaged a record 28.3 points a game. Only 27 now, when Mr. Basketball's playing days end in a few years, he is ready to move over to another kind of court—law—and start a second career.

Most experts agree that the two-handed set shot is still the most effective when 18 feet or more from basket



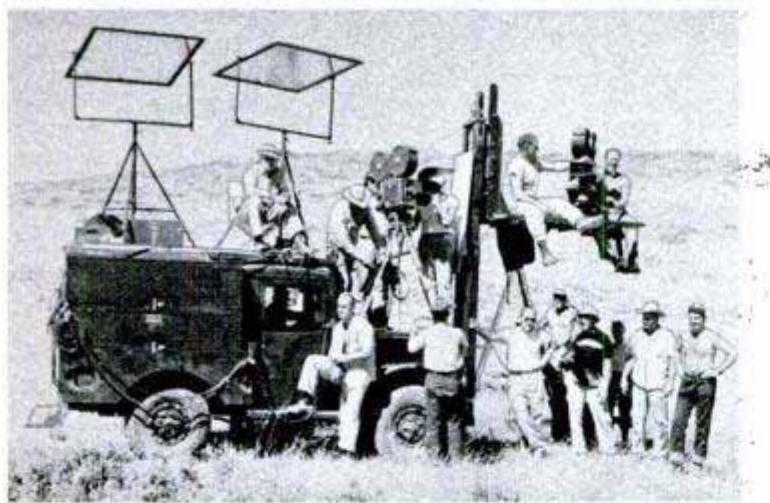
Whisk Rake

With its tines set at an angle to the short handle, a new rake simplifies the chore of cleaning around low garden shrubs. The offset teeth make it easy to reach behind the bush. Made of sheet aluminum, the tool was designed by a California printer who is now producing them in quantity.

Water Pressure Stretches Steel Tubes

Plain water is being used to stretch heavy steel tubes to the exact diameter desired. At the National Tube Company, the tube to be expanded is placed in a form to prevent it from swelling beyond the desired diameter. Then a plug is fitted at one end and a ram at the other. Three pumps force water into the pipe,

building up such pressure that the steel tube expands. Pressures as high as 3000 pounds per square inch are used.



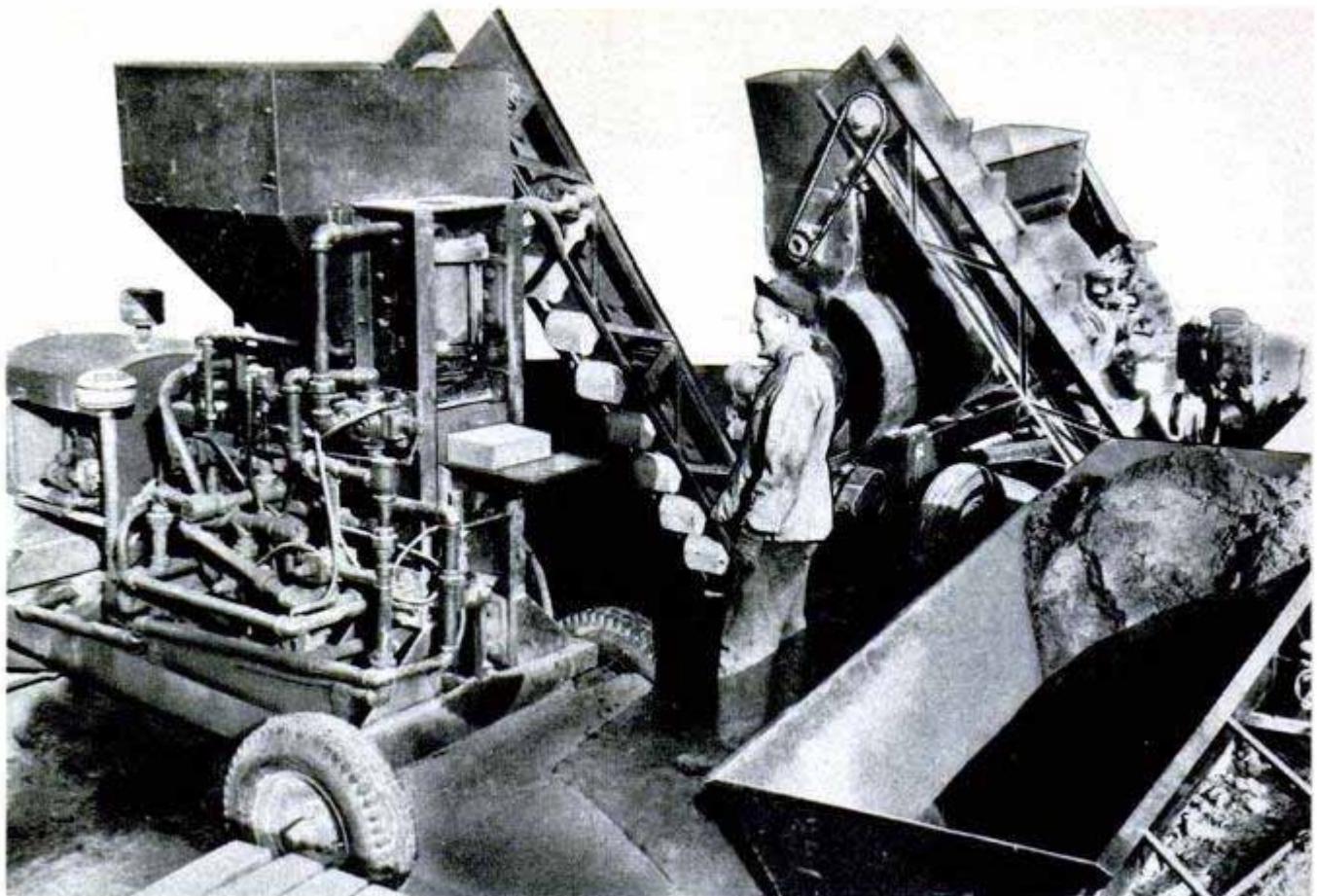
Pom-Pom Gun Fires Arrows

Indian warriors of Buffalo Bill days had nothing to compare with a pneumatic push-button arrow launcher developed by a Hollywood craftsman for use in filming Westerns. The launcher fires up to 12 arrows and can be aimed like a gun, simulating precise bow-and-arrow work for the camera. Compressed air powers the 12 firing tubes, each of which is controlled by a solenoid valve. The operator carries a switch panel to fire the arrows remotely when given a cue by the director.

Camera Truck

Built by two studio workers, a camera truck provides movie makers with a mobile boom that will go just about anywhere. The truck, a former Army weapons carrier with four-wheel drive, has a hydraulic fork lift on its front end. The fork of the lift serves as a platform for the camera and crew. With its powerful four-wheel drive, the truck can roll across rough country, making it a valuable piece of equipment for filming Western pictures.





Under 1000 pounds pressure to the square inch, machine at left shapes blocks from soil mixed with cement at rate of seven to 10 per minute. Below, blocks being used in construction after a five-day drying period



Soil Made Into House Blocks At the Construction Site

Homes can be literally built "dirt cheap" with a three-unit outfit that drives up on the front lawn and uses soil dug from the foundation to make blocks. The blocks, measuring approximately 3½ by 8 by 12 inches and weighing about 25 pounds, withstand a pressure of 1000 to 2400 pounds to the square inch before crushing. To make them hard and water-resistant, the soil is mixed with portland cement or emulsified asphalt. The finished blocks are laid with ordinary masonry mortar, and are insect and verminproof. The surfaces of the blocks can be painted, if desired.

Silicone Treatment Waterproofs Concrete Building Blocks

Silicones, the wonder-working new synthetic materials, now promise to help the homeowner keep his basement dry. A new solution made with silicones forms an invisible film over concrete building blocks, making them impervious to moisture. Blocks treated with the solution have withstood five days of severe water and heat tests which the manufacturer states are equivalent to at least 12 years of normal

weathering. Similar blocks treated with solutions which contained no silicones failed in one day or less. The waterproofing solution can also be used to treat porous stucco and sand-lime brick. The invisible film permits oil painting on any of these surfaces with longer-lasting results.

The Federal Government now owns three eighths of all the land in Montana.



Clearing the track for timber, this snowplow pushes through Idaho woods

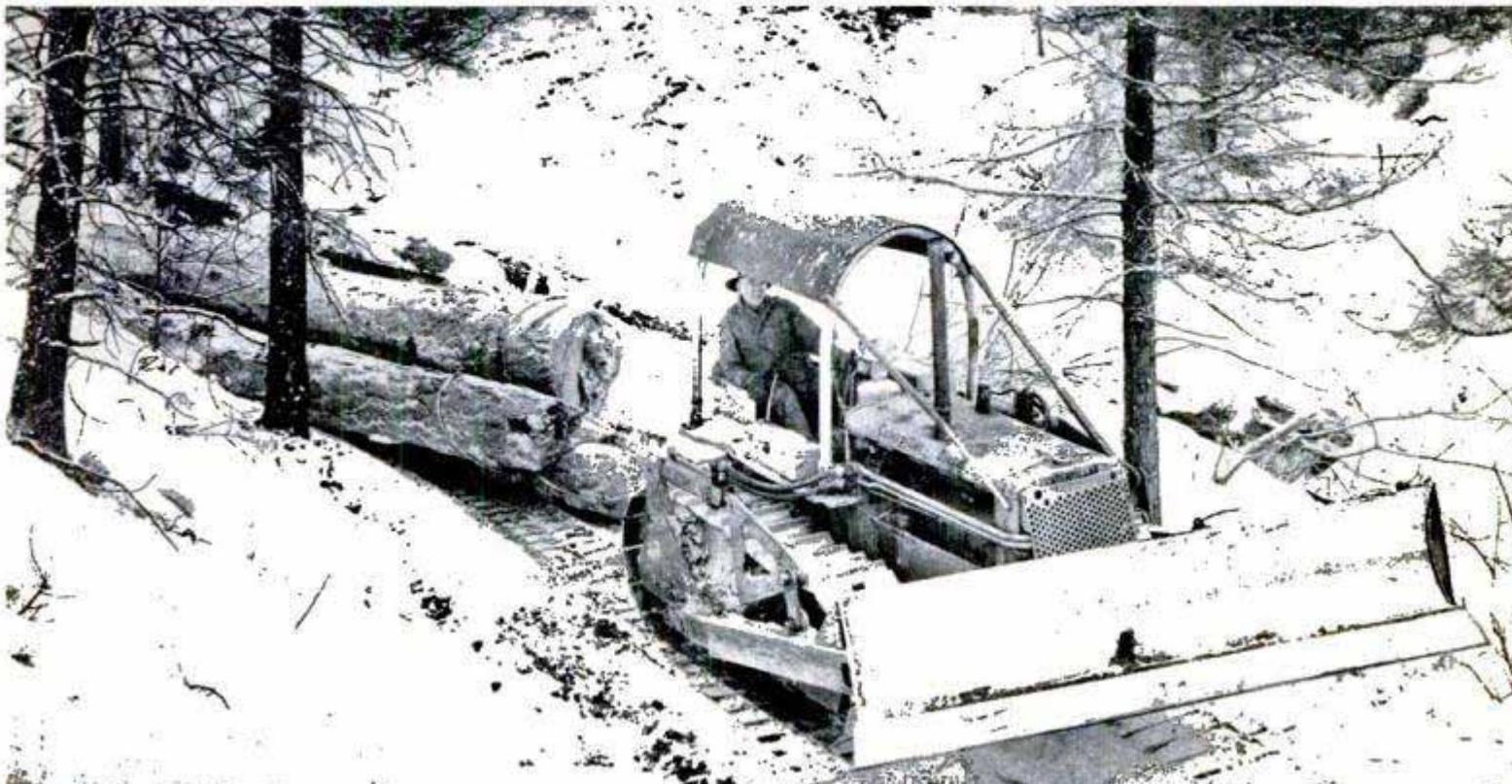
Logging at 40° Below

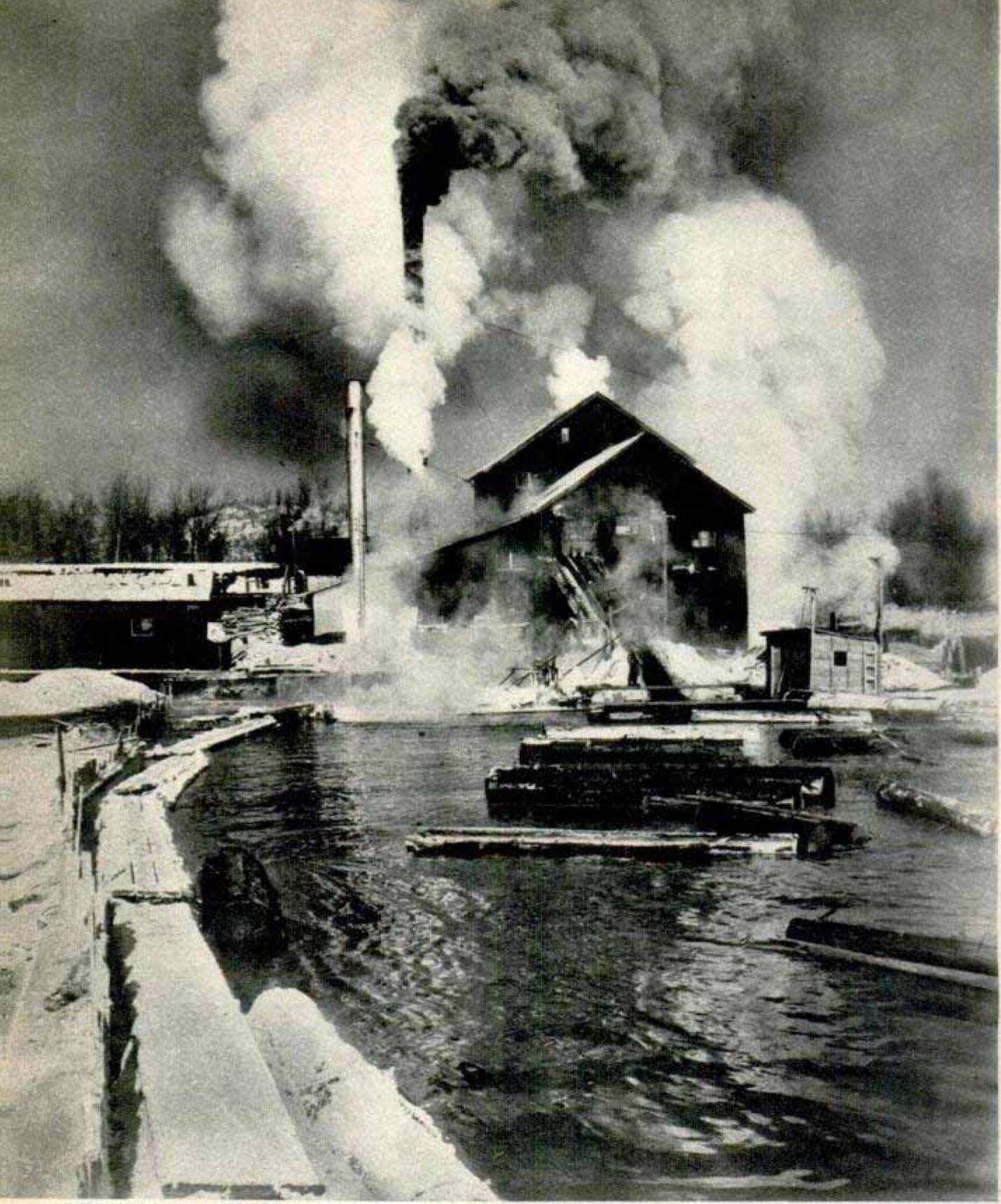
By Robert H. Forbes

WINTER is the best season for logging, even in the rugged, snow-filled forests of north Idaho where temperatures hover around 45 degrees below zero. In spite of snowstorms, drifts the size of a house and weeks of below-zero weather, a steady stream of timber comes out of the woods there in December, January and February.

Ground frozen concrete-hard is the big reason. During spring, summer and fall, logs are skidded from the woods to a landing by raising their front ends on a traveling arch behind the towing tractor. Sometimes "pans" are slipped under the logs for easier sliding on mud or bone-dry ground.

Snow-covered trails on which logs skid easily make loggers certain that winter is the best time of the year





Pack River Lumber Co. photo

Through a month of sub-zero weather, this pond was kept ice-free by steam heat and a motor-driven agitator

But in winter the logs can be hauled out just as they are cut, without the bother of pens or arches.

"You bet it's good logging in winter. Logs sure act alive then," says Axel Anderson, foreman at Potlatch Forests' Camp 42. Axel has seen over 40 winters in the Idaho woods.

Idaho forest landings are always along creeks and the timber is on the mountain-side. That means a downhill skid. In win-

ter, tractor drivers have to be on their toes to steer clear of logs that they are taking to the landing. Logs run downhill so easily that they want to get there before the tractor!

Winter does bring some problems though. Fallers, the men who fell the trees, have to add a shovel to their loads of ax, cross-cut saw, wedges and mallet. They dig down around the base of each tree so they will leave a stump of minimum height.



Loggers have time for fun. A camp cook is "sparring" with a hungry deer forced out of woods by deep snow

At Winchester, Idaho, Craig Mountain Lumber Company forester Stanton Ready says, "The last two winters were the toughest that I've seen in 35 years of knocking around these parts.

"Yet our greatest trouble here came after logs had been delivered to the saw-mill pond," he continues. "Steam pipes warming our 'hot pond'—that's where the logs are kept before going to the mill—just weren't big enough. Sometimes we had to dynamite the logs out of the ice to keep the mill running."

A Colburn sawmill hot pond operated all last winter with a minimum of steam pipes, despite temperatures ranging from zero to 44 below during the entire month of Janu-



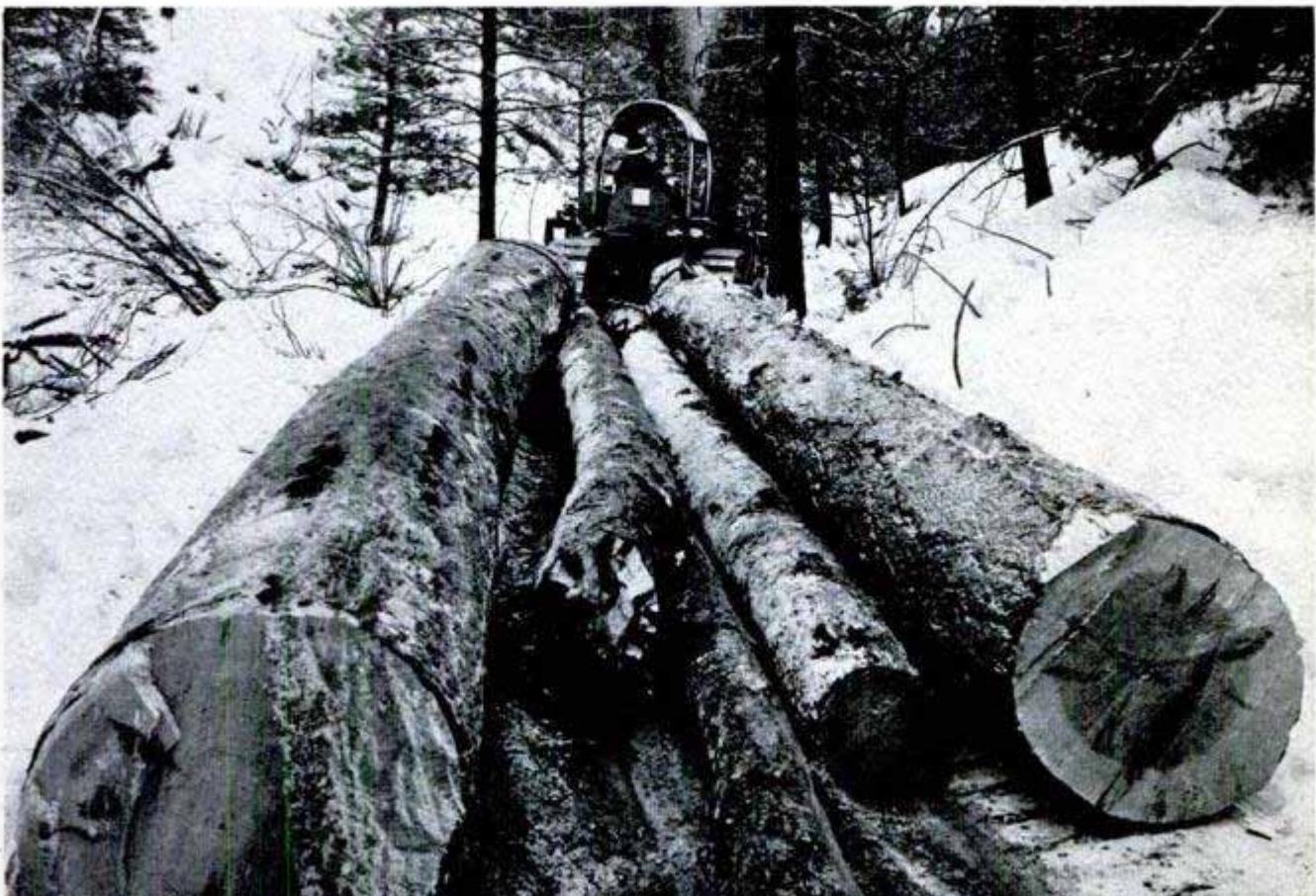
As fast as the logs are skidded down to the landing, they are loaded on flatcars for the trip to the mill

ary 1950. The secret: A 75-horsepower motor spinning a large boat propeller churned the water in the pond to keep ice from forming.

Winter in the woods calls for warm clothing—the longest of long underwear, two or three pairs of stockings, rubberized boots, shirts of pure wool and a good pair of gloves. Many north Idaho loggers swear by "Malone" pants, so heavy with wool that the city dweller, wearing a pair of them for the first time, feels as though he is climbing a flight of stairs even when he's walking downhill!

But, despite all this, the logger says, "Winter's okay. That's when the logs act alive!"

Going-away view of hundreds of board feet of ponderosa pine being skidded by tractor down to the landing





Rocking-Chair Stretcher For Mountain Rescues

Injured mountain climbers are brought down rugged slopes safely and comfortably in a stretcher curved like a rocking chair. Lowered by means of a wire cable, the stretcher slides gently over rocky crags. It can also be equipped with a small wheel for traveling over level terrain or suspended from a cable like an aerial tramway for crossing gorges.

Cross-Channel Cable

Linking continental and British power systems, a sunken cable under the English Channel would be practical and worthwhile, according to Sir Harold Hartley, president of the British Association for the Advancement of Science. The cross-channel cable would give a better balance between seasonal demands and, at the same time, furnish stand-by power potential in case of emergencies. The proposed underwater power link, says Sir Harold, could be of 250,000-kilowatt capacity.

U. S. Air Force to Build All-Magnesium Airplane

After 100 hours of test flying an F-80 wing made entirely of magnesium-zirconium alloy, the U. S. Air Force is now planning an all-magnesium airplane. Although seven times thicker than the skin of a con-

vventional wing, the magnesium wing requires few internal reinforcements and leaves larger fuel-tank space. Magnesium is used instead of aluminum alloy because it is easily obtained from ocean water.

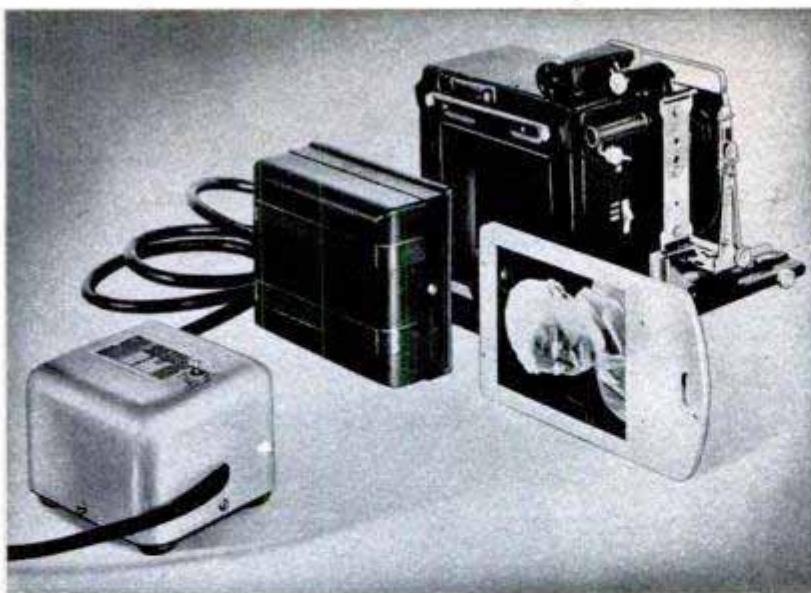
Circular "Yardstick"

Accurate to one part in 40 million, a new international "yardstick" for laboratories may be adopted that is based on the wave length of light waves emitted from bombarded mercury. A rare form of mercury artificially made from gold in the Oak Ridge atomic pile is bombarded with radar waves, causing the mercury atoms to emit light. By measuring these circular waves, scientists have a yardstick that is extremely accurate and will never change or be lost. It is hoped that the standard will be adopted by laboratories around the world.

It took exactly one month to take the 27,000-ton carrier Princeton out of mothball wrappings and prepare her for sea duty.



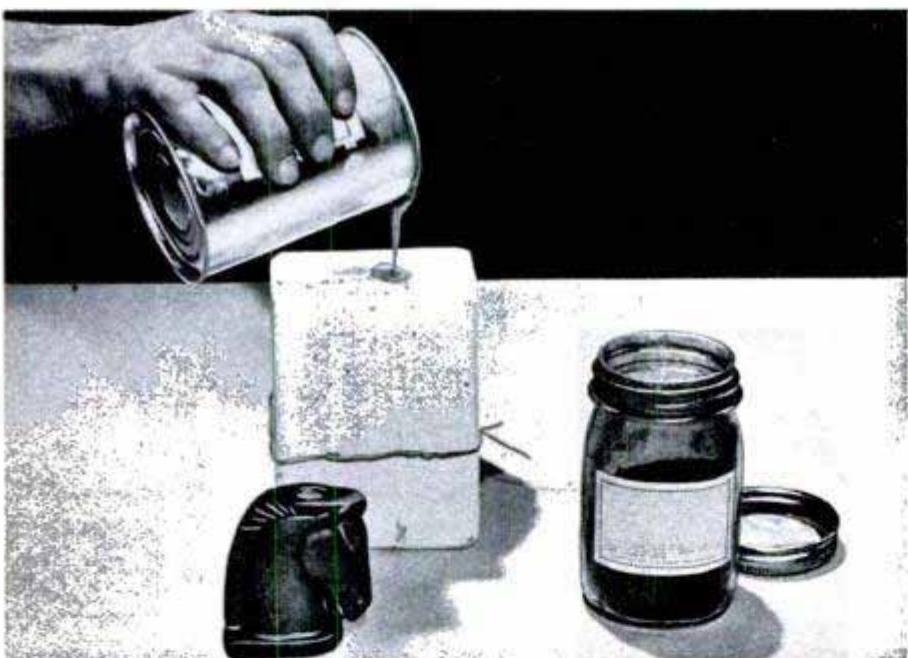
Westinghouse photo



Cold-Light Back Makes Camera an Enlarger

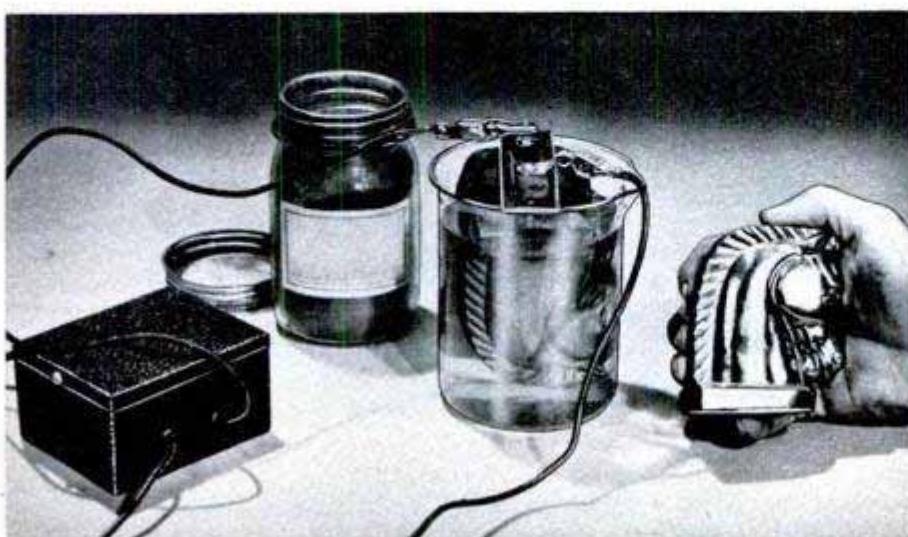
Replacing the ground glass on a press camera, a cold-light unit converts the camera into an enlarger. The light gives off no heat to buckle film or harm the camera or lens. Also available is a stand to which the

camera is attached by its tripod socket. Included with the conversion kit is a glassless negative carrier and a power pack. The light unit can be used alone as a transparency viewer.

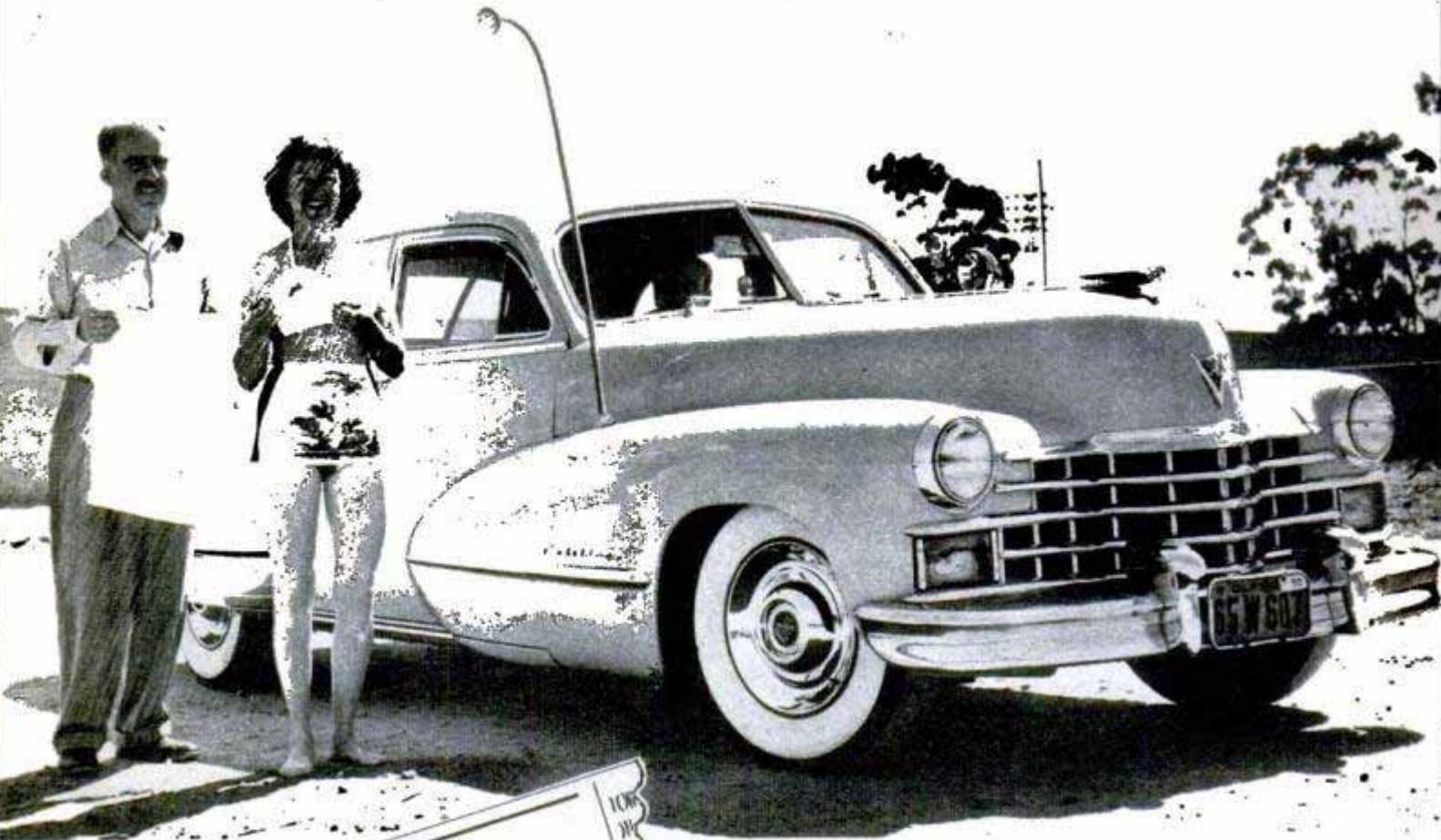


Electroplated Plastic Takes High Polish

Hobbyists have a new material — a plastic that can be cast and then electroplated. A hardening catalyst is mixed with the liquid plastic before it is poured into the mold. It dries and can be removed from the mold in about 20 minutes. The cast is immediately ready for electroplating, which is done in the ordinary way by immersing it in the proper salts and introducing an electric current. The plated plastic is then buffed to brighten the surface. A final coat of clear lacquer or glaze is applied to the casting to protect the plating.



Sources of available products described in this issue are listed in the index, starting on page 14. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois



ROOM
with BATH

-ON WHEELS

Mattar stands by with a towel while a guest takes a shower off the right front fender. That water is heated, too.

IF YOU SAW Louis Mattar's car rolling along the streets of San Diego, Calif., you'd probably consider it just another attractive automobile. But if you looked inside the car you'd find everything from a barbecue pit to an Arabian water-cooled pipe. And if Mattar really wanted to show off his wondrous vehicle he might let you take a shower bath just off the right front fender.

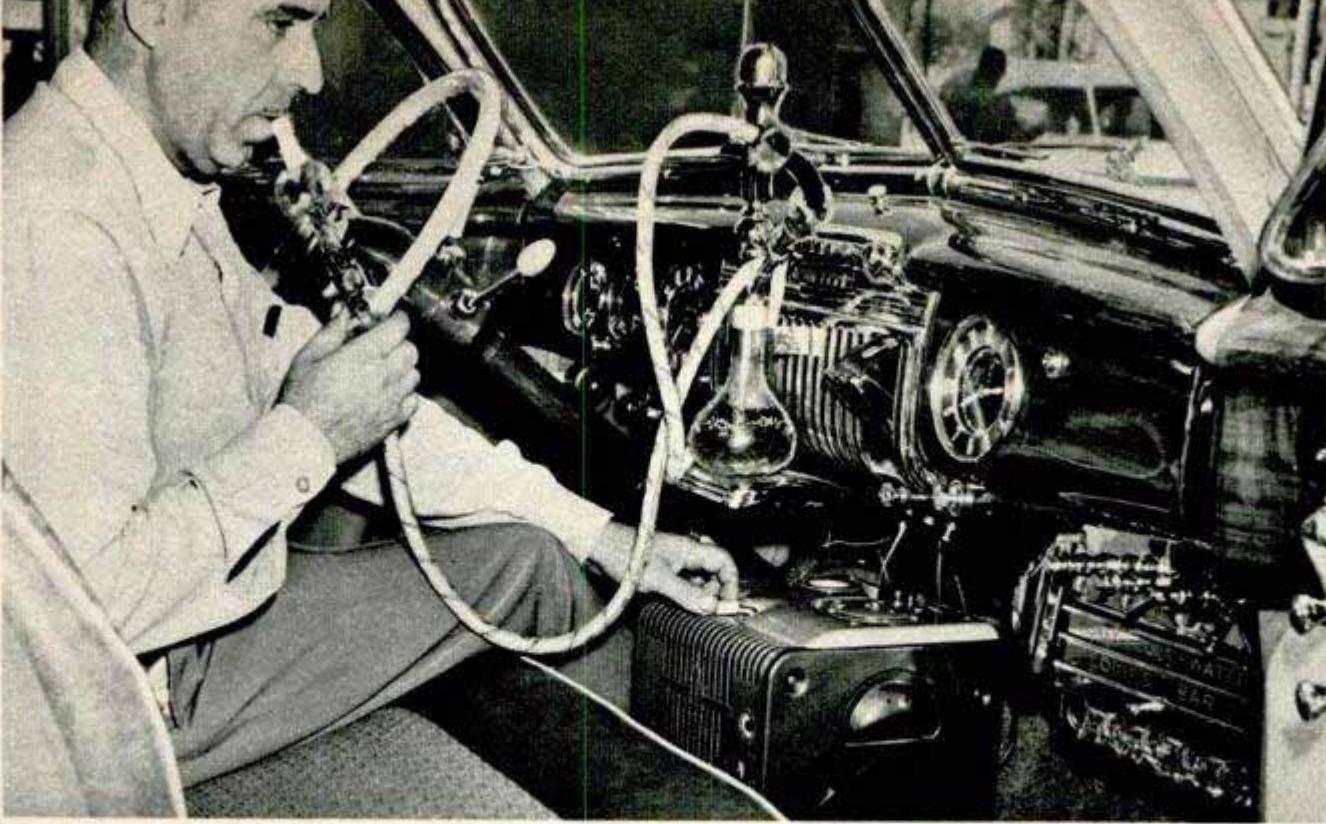
Mattar has equipped his 1947 Cadillac with more luxuries than can be found in most homes. Just to the right of the driver's seat is the Arabian pipe. If someone else happens to be driving, Mattar can pull the long tube all the way to the back seat where he can puff in pleasure. Installed beneath the pipe is a demountable wire recorder and beneath the dash is a miniature soda fountain. Switches operate electric pumps to send the beverages flowing

out through spigots. And beneath the fountain is a pull-out sink.

In the rear seat, Mattar can pull down the center armrest to reveal the electric barbecue, which slides out along its own tracks.

After a dip in the ocean, Mattar takes a shower bath under a fresh-water spray. He removes a dummy radio antenna from the right front fender and slips a pipe and shower head into place. Water is pumped from tanks in the engine compartment, with the water in one tank heated in copper tubing wound around the engine exhaust. Press a button and the water sprays out at the right temperature.

Mattar, who owns a garage, eventually plans to install hot running coffee, a television set, a two-way telephone and a table in the back seat. When that's done he figures he'll buy a brand new car and start switching his improvements to it.

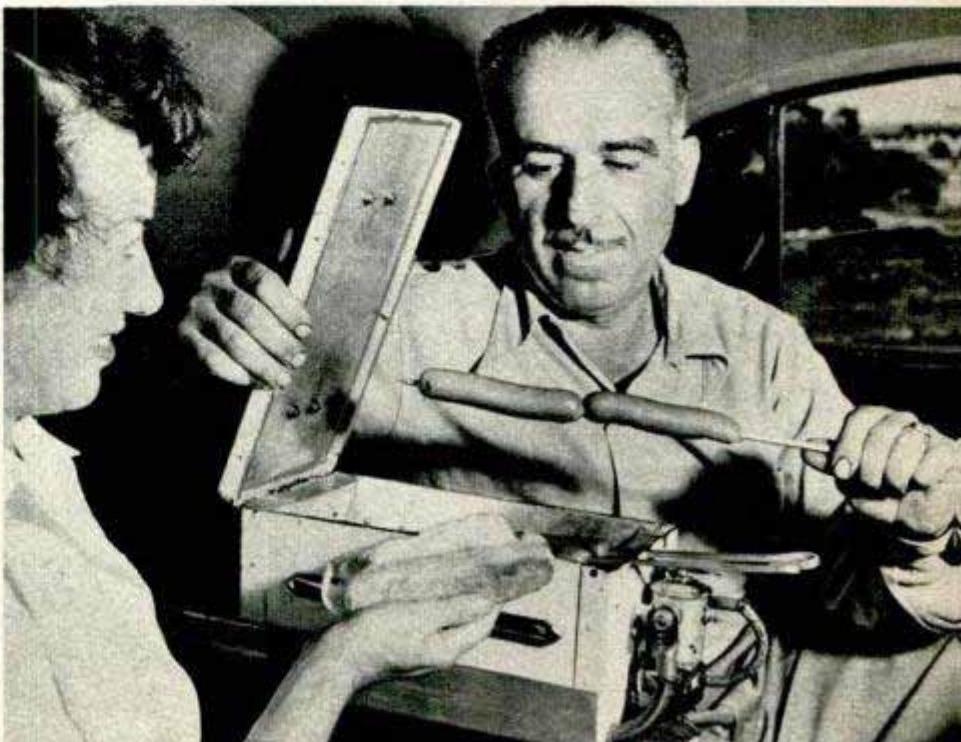
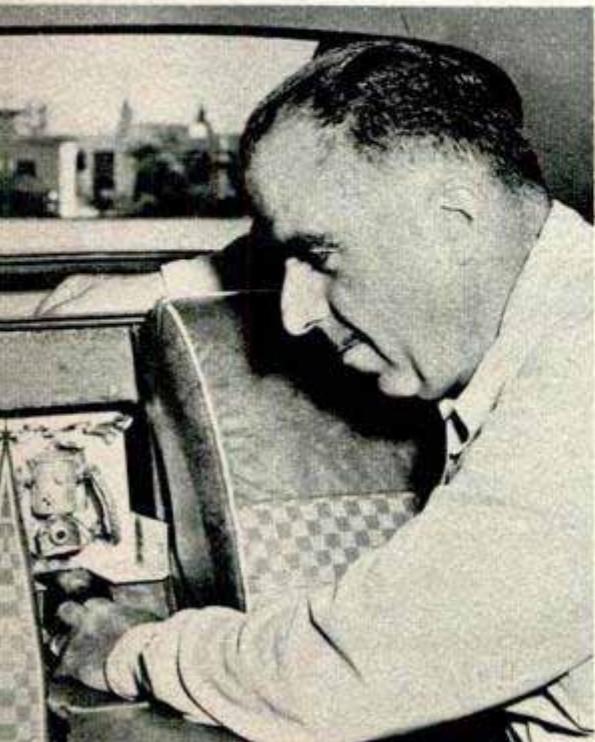
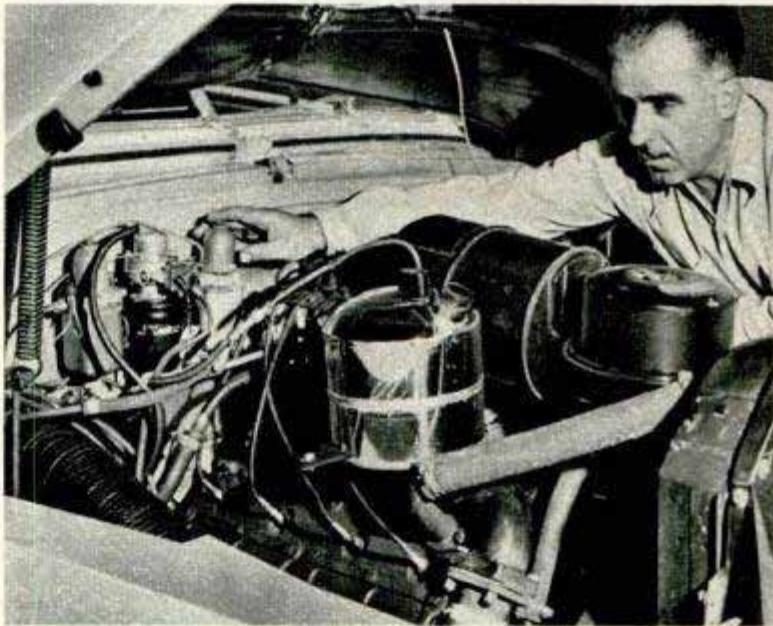


Taking a puff on his Arabian water pipe, Mattar turns on the wire recorder for a playback of some dictation. Note the soda fountain with pull-out sink at lower right

Right, engine compartment is filled with mechanisms. Can in foreground is the hot-water reservoir. Mattar's hand rests on one of three pumps which operate plumbing

Lower, right, electric barbecue slides out along the back-seat armrest and Mattar prepares a snack for guest. Lid pivots down and the "hot dogs" roast inside container

Below, after the meal he slides the barbecue back into its compartment behind the seat. Automobile starter switch, mounted on the roaster, turns current on and off





Lightweight Resuscitator

Pumped like an accordion, a miniature resuscitator weighing only two pounds can be used on a victim regardless of his position, provided his face can be reached. The resuscitator is designed to revive victims whose breathing has been stopped or impaired by gas inhalation, drowning, electric shock or heart failure. It is pumped at a rate of 15 to 18 times a minute while a facepiece is held over the victim's nose and mouth. The unit introduces either air or oxygen into the victim's lungs; when oxygen is used, a tube connects the oxygen source with the resuscitator. Automatic valves prevent the mixture of expelled air with fresh air or oxygen.



Hot-Water Tank In Crystal Tower

Completely surrounded by glass, a 140-foot-tall hot-water tank will provide central heating for the 10,000 residents of a new London housing development. Inside the glass wall is a steel tank, well insulated to retard heat loss. The glass, mottled on the inside and smooth on the outside, also helps retain the heat. Exhaust steam previously wasted by a large power plant across the Thames River from the development is used to heat the water. The steam is piped under the river to the "crystal" tower, saving 10,000 tons of coal a year. The system also provides continuous hot water for the development.



Cruising Stamp Stand

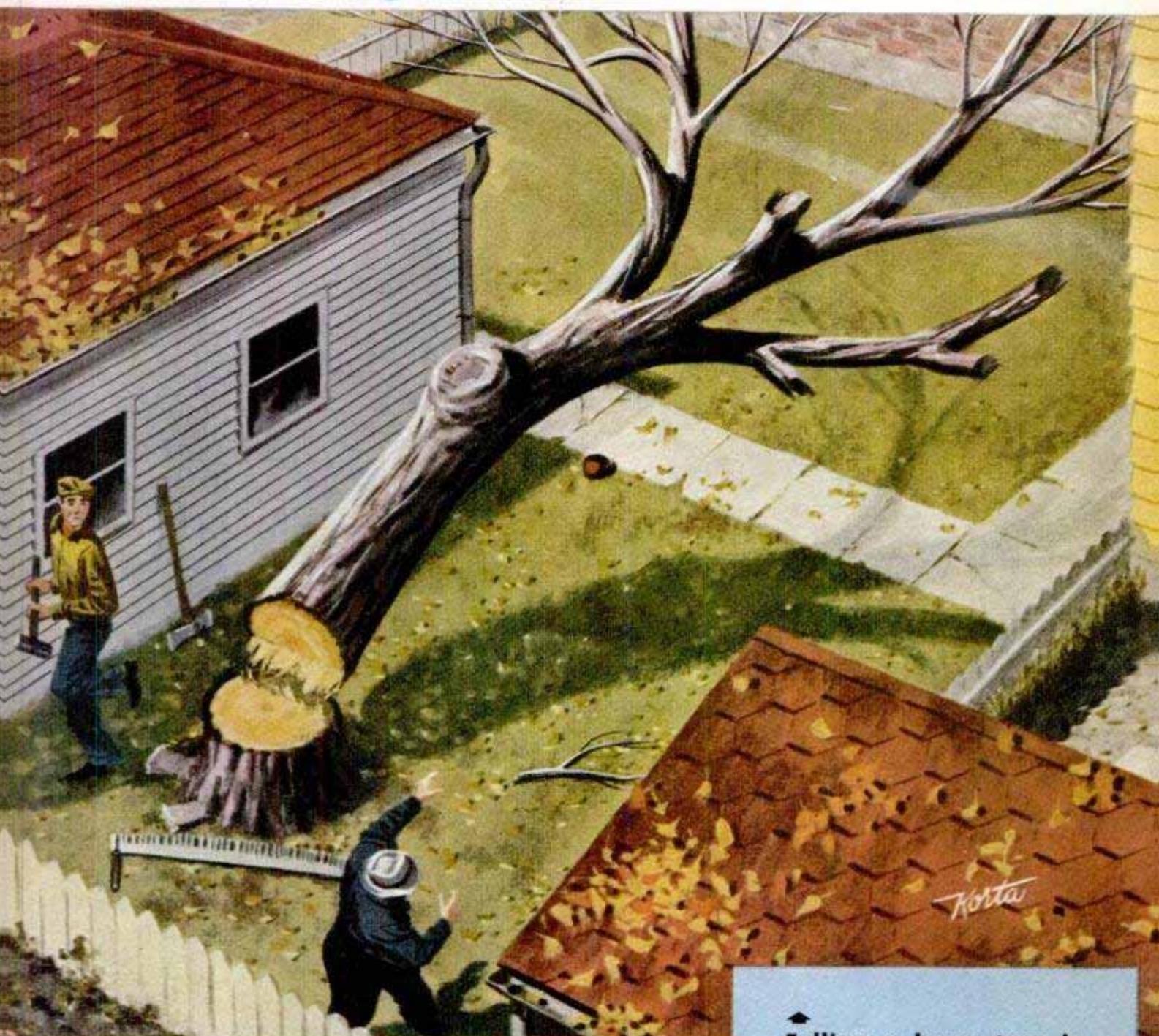
Cruising the streets of Paris, France, is a traveling stamp stand which carries stamps of foreign issue for collectors. The stand is a small car which has been converted by its owner, Pol Charriaud, into a traveling salesroom. The top lifts up to display the stamps and a counter top holds books filled with collections.

Cotton is the American farmer's biggest cash crop—in 1949 the farmers received \$2,380,000,000 for cotton, \$2,168,000,000 for wheat, \$1,358,000,000 for corn and \$904,000,000 for tobacco.

the

POPULAR
MECHANICS

CRAFTSMAN



↑ Felling a large tree in limited space can be as easy as felling a small one—if you follow the rules. A timely article on page 192 lets the homeowner in on the tricks used by the professional tree remover



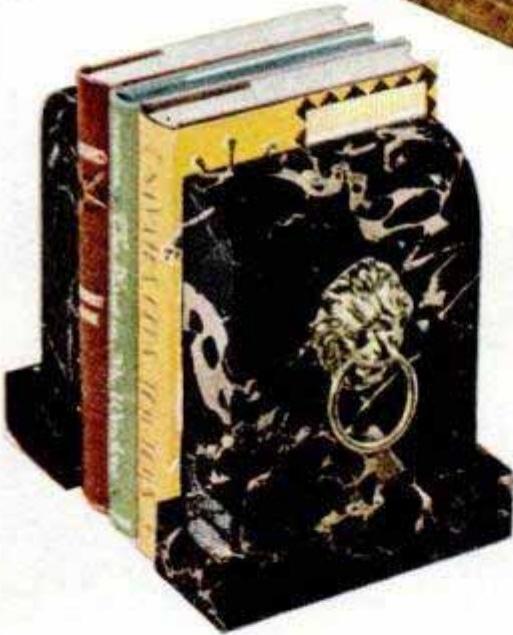
↓ Fun for youngsters, these phones also can be used between the house and the garage or barn. See page 191

Beautiful Finishes

A



B



C



D

Attention home craftsmen! Now you can beat the high cost of cabinet woods for your projects. New plastic veneer, applied like a transfer, duplicates rare and fancy woods with remarkable realism. Works like magic on old and new furniture

By Wayne C. Leckey

HAVE YOU priced cabinet woods lately? It's little wonder you may have thought twice about building any piece of furniture. Prices have skyrocketed on hardwoods and rare veneers, causing the hobbyist with a limited budget to forego building projects requiring expensive woods. Realizing the predicament of the home craftsman, the editors of *Popular Mechanics* and The Meyercord Co., one of the manufacturers of plastic veneer, went to work to make this material available to the individual and also easy to apply by anyone at home. Plastic veneer has been used industrially for many years, but the fast-setting cement used to apply it is impractical for home application. To overcome this difficulty, the Meyercord people spent months developing a slow-setting cement which they felt could be handled easily by the inexperienced worker. Plastic veneer opens vast possibilities in the home-craft field, for now you can build furniture from the cheaper grades of hardwoods, plywood and hardboard and transform it into beautiful pieces by veneering the surfaces.

with PLASTIC VENEER

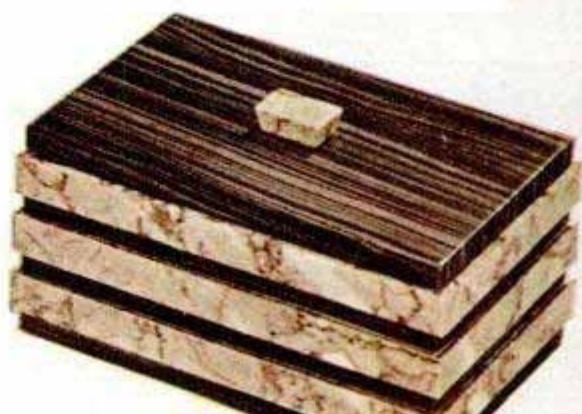
Part I

PM color photos by
Paul T. Hutchinson

S N° 521

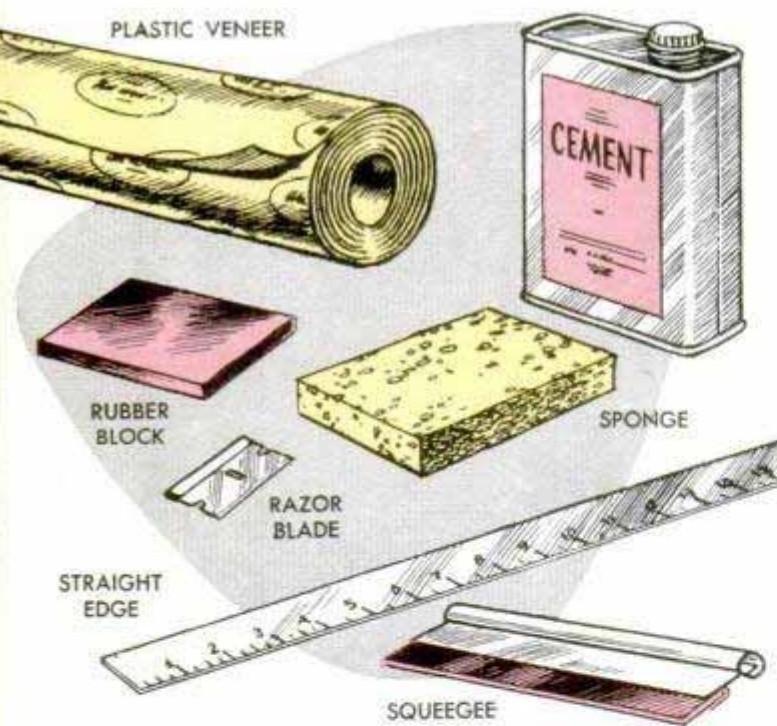


A—Gray primavera. B—Straw zebrawood. C—Verdi antique. D—Brazilian onyx. E—Mahogany crotch. F—Jaune Benau. G—Satinwood. H—Rose de Brignoles. I—Walnut stump. J—Striped mahogany. These are but a few of the many beautiful plastic finishes from which to choose.





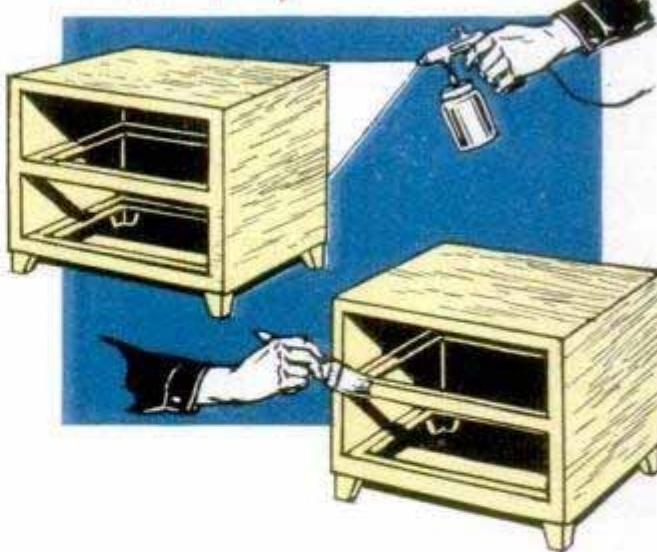
Here's All You Need



2 Cutting Veneer



1 Applying Sealer

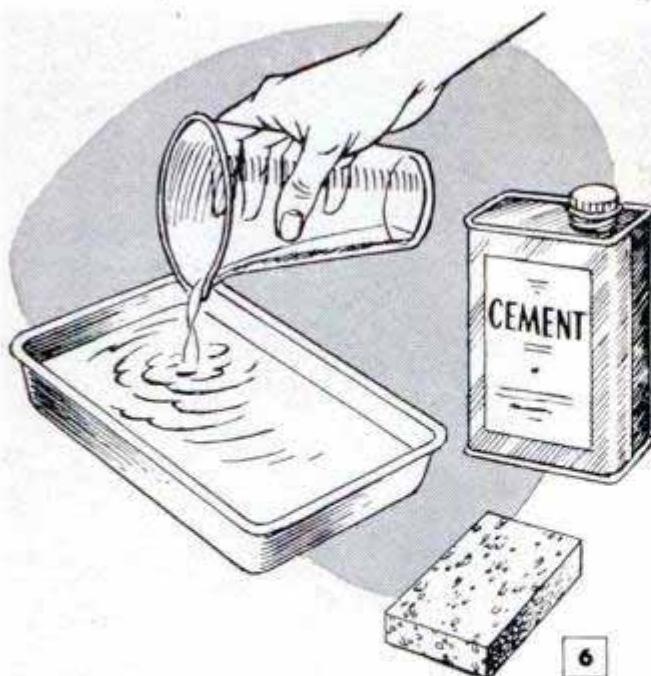


That the results will amaze you is evidenced by the items shown on the preceding pages, especially when you consider they were made of common poplar plywood. Once applied, the veneer is given a good protective coating of lacquer or varnish just as you would in following any finishing schedule. Including the finishes shown here, there are some 30 or more wood-grain and marble patterns available, which are inexpensive and offer a wide selection of popular veneers.

The projects pictured were designed exclusively for *Popular Mechanics* by John Bergen, noted furniture stylist, and were built and covered with plastic veneer to show graphically what can be done in your own workshop. However, plastic veneer is in no way limited to just new furniture or other craft projects. You can apply it to old furniture with equally gratifying results, either to renew the present finish or to change the wood grain completely. For example, an old piano which may be an eyesore in its present condition can be brought up to date by covering it with this new veneer. Ornate moldings are first removed to facilitate covering, and perhaps the top cut down to attain a more modern appearance. Glass coffee-table tops can be marbleized, as well as fireplace mantels, and walls can be "tiled" to produce an exquisite

3 Removing Backing





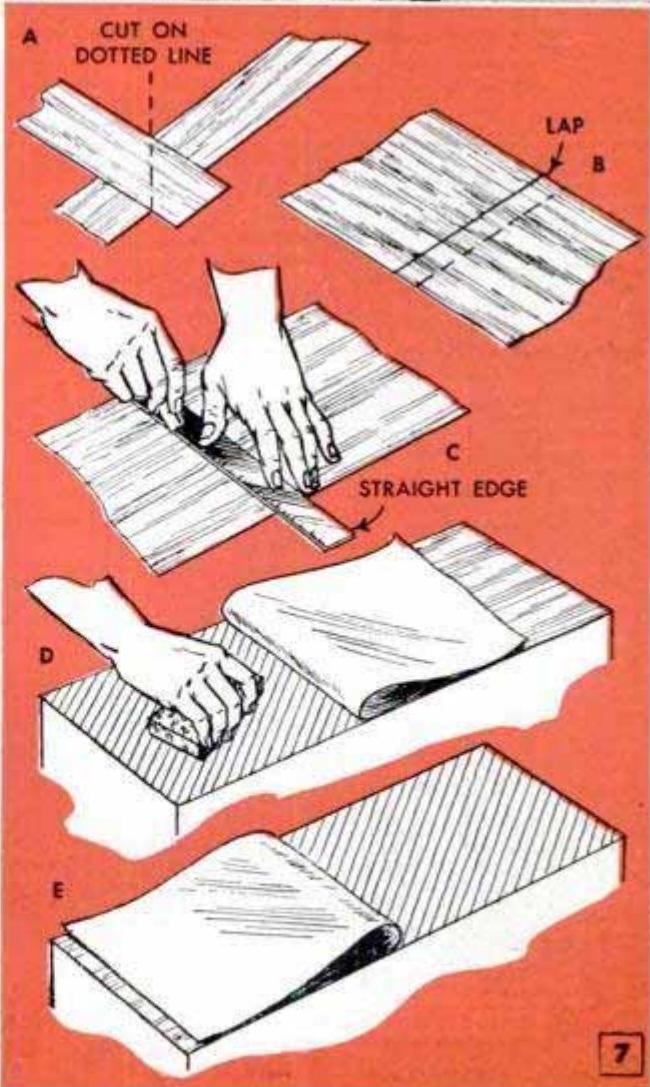
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4 Applying Cement



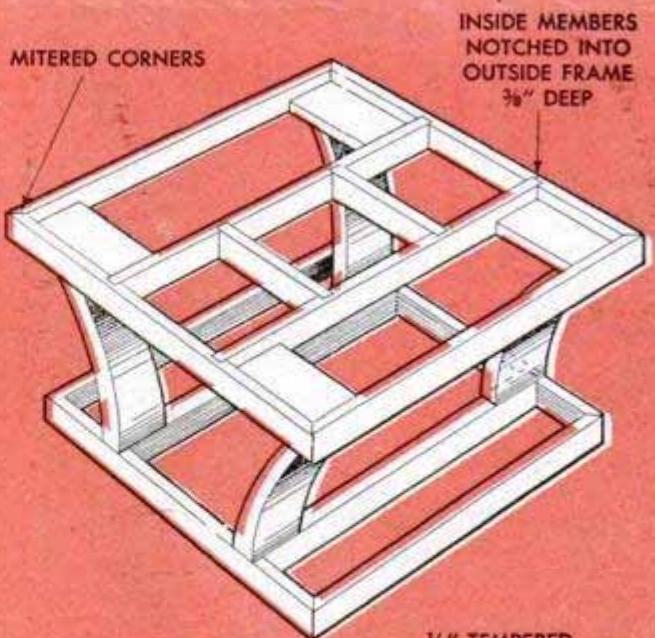
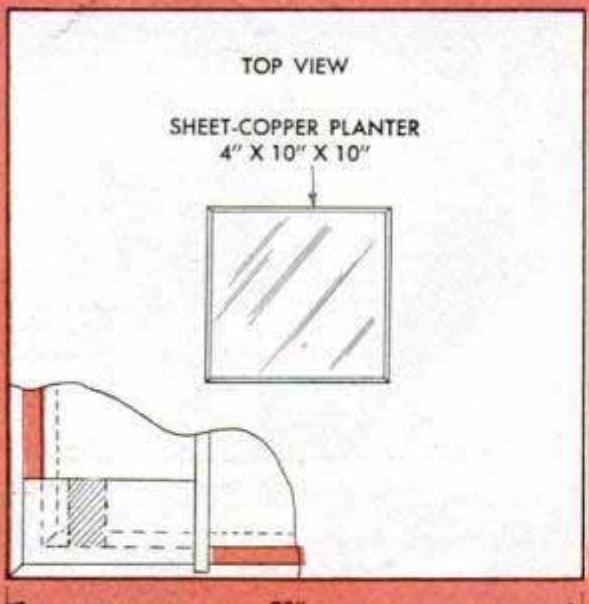
5 Squeegeing Veneer



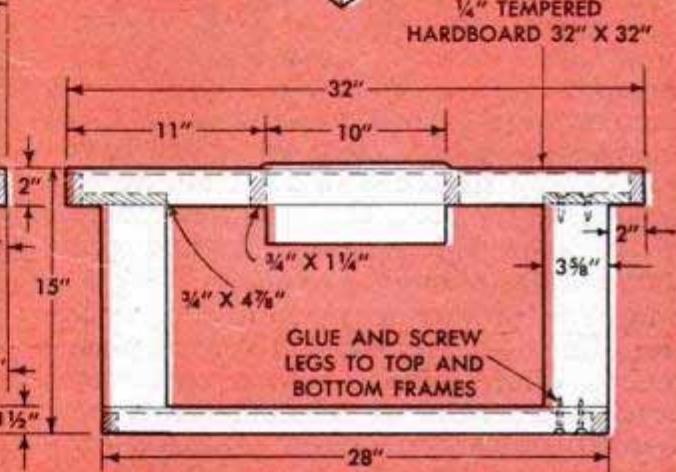
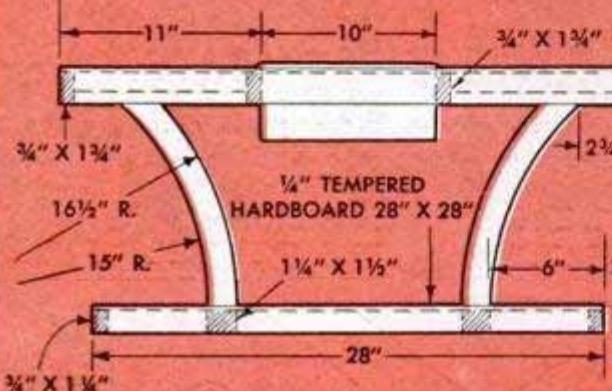
bathroom. There are endless applications. In covering both new and old furniture it must be remembered that, while plastic veneer can be stretched to a certain degree, the lines of the piece to be covered must be fairly plain. Tricky moldings and compound angles should be avoided.

Besides producing a simulated wood-grain finish of remarkable likeness, plastic veneer offers several other advantages which are a boon to the home craftsman. Being opaque, the veneer conceals construction joinery, such as a joint between two boards, as well as laminations of plywood. In addition to possessing the actual color and wood-grain of the true wood, the veneer, after application, does not require staining, filling or sealing as in normal finishing procedures. This alone is a great advantage to the man who has had little finishing experience. Another advantage is in the uniformity of grain. Perfectly matched panels of identical pattern can be had, an example of this being shown on the doors of the TV console on the opening pages. Still another important feature is the ease of application as compared to the application of wood veneer with its clamping problems.

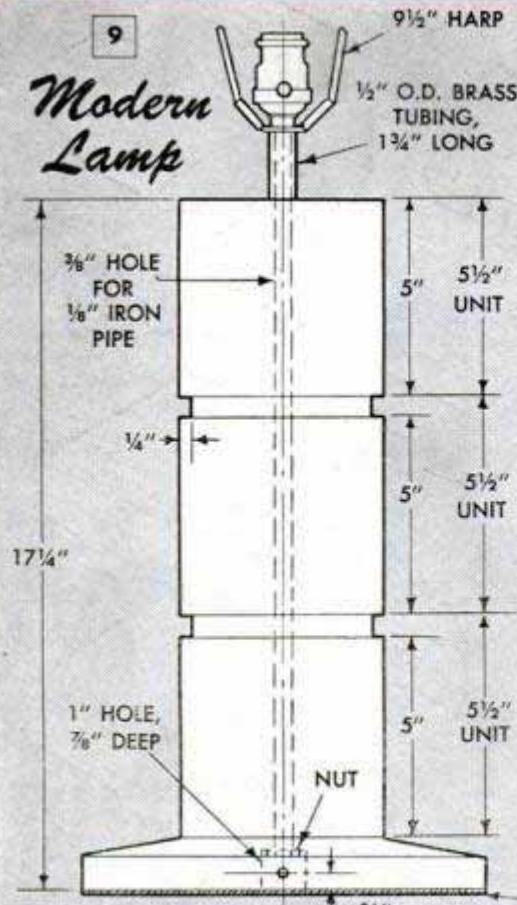
What is plastic veneer: Used commercially in car interiors and also on the cabinets of most radio and television manufacturers, plastic veneer somewhat resembles a decal transfer. It has a paper backing that is removed by soaking in water but, unlike a decal, it is cemented to the surface with a special adhesive. The veneer, which is available in sheets containing from 5 to 6 sq. ft., consists of a film of lacquer of paper thickness and is printed in color from photo engravings of the actual wood itself. The veneer is carried, face down, on a paper backing which is marked to identify the veneer. The direction of grain is determined



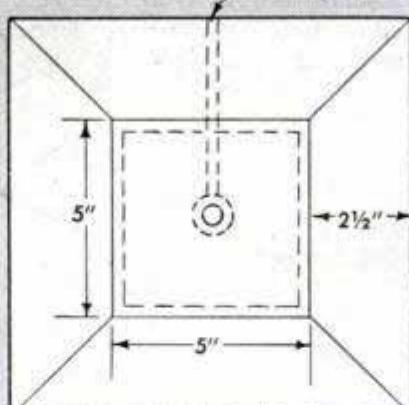
8 *Cocktail Table*



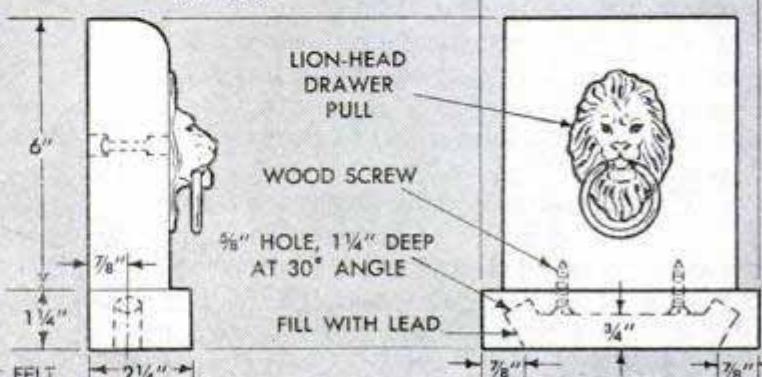
9 *Modern Lamp*



1/4" HOLE FOR LAMP CORD



10 *Book Ends*



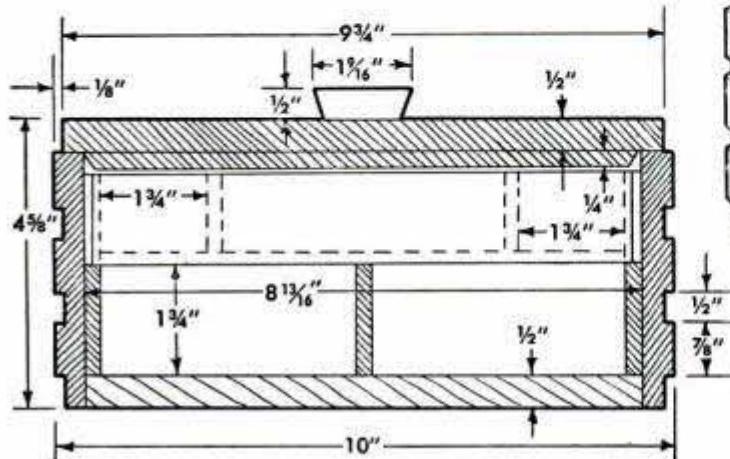
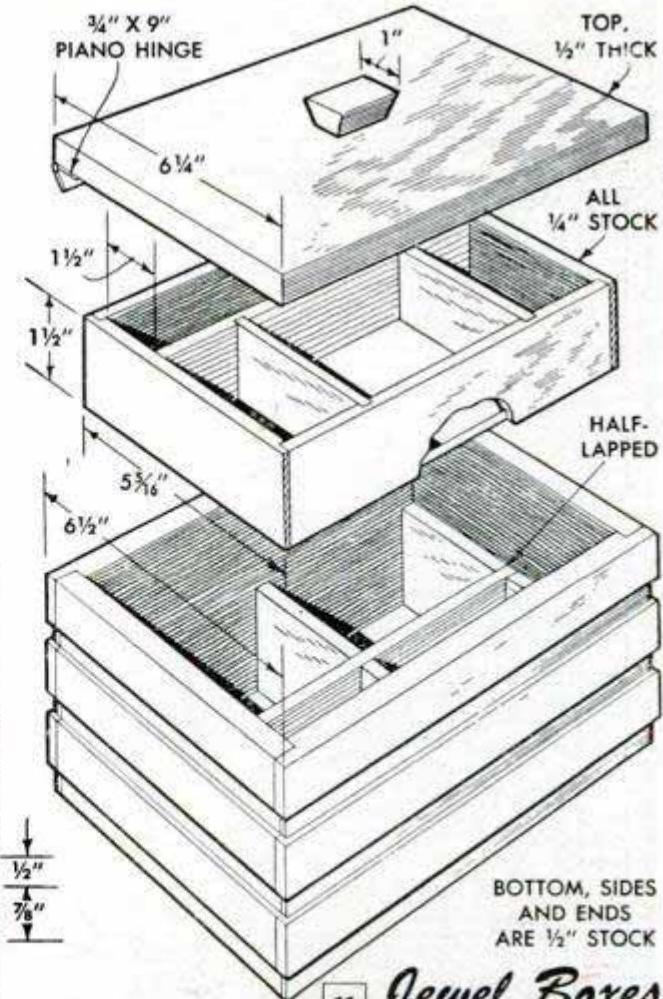
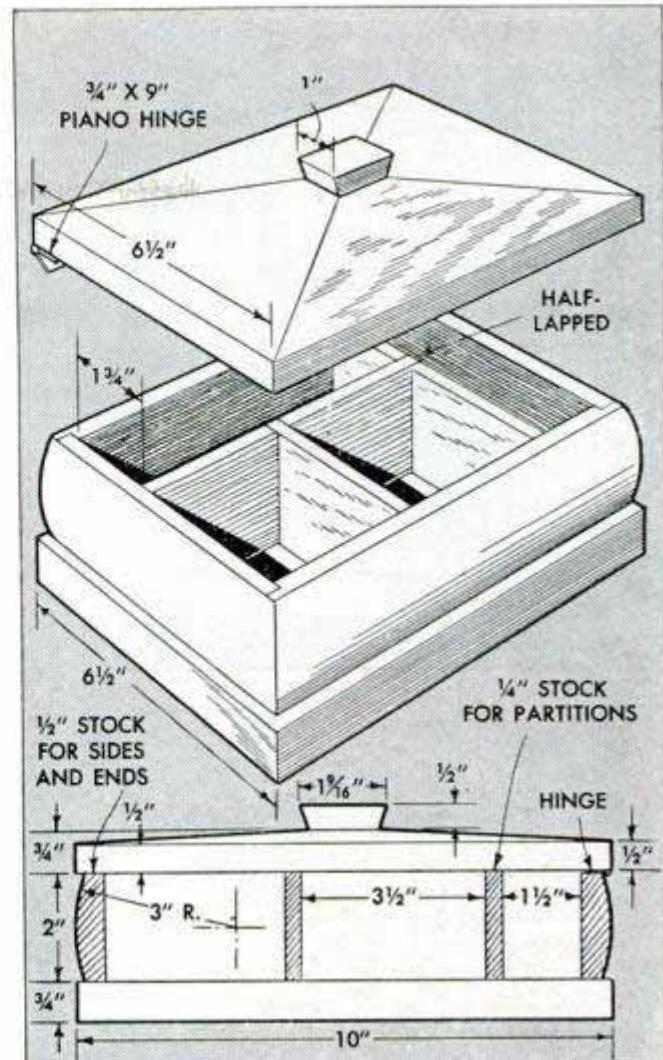
before cutting by holding up the sheet to a strong light. This also will show you the centerline of the design of crotch patterns.

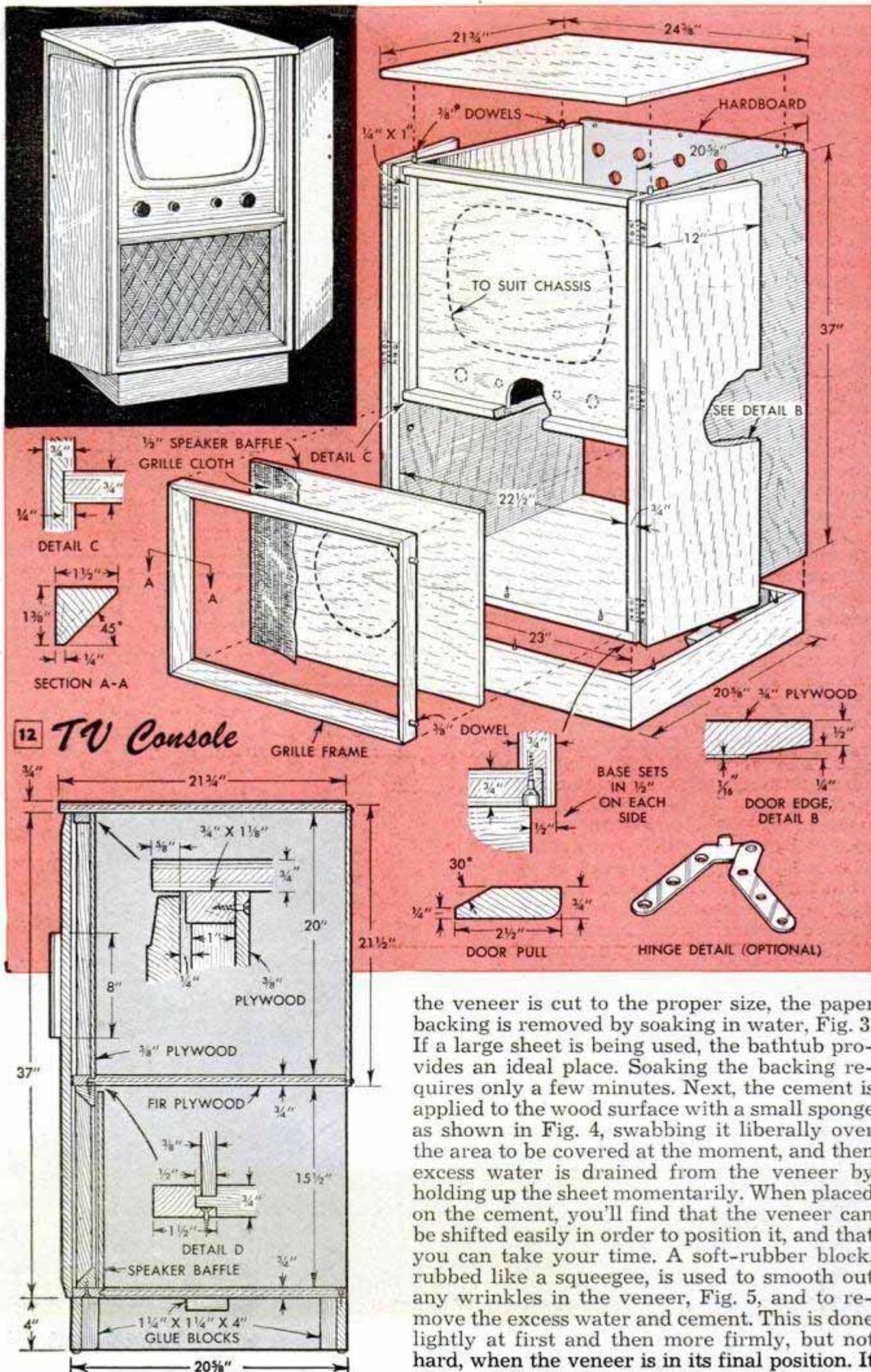
Special adhesive used: The cement for plastic veneer is marketed in concentrated form and is diluted for use with 40 percent water, Fig. 6. The cement allows ample time to position the veneer before setting and requires approximately 48 hours to dry completely. Of course, it's important to keep the can of cement tightly capped and to shake the contents well before mixing with water.

Surfaces which can be veneered: Practically any smooth surface can be covered with plastic veneer. Birchwood is considered the best, both solid and plywood stock, although excellent results can be had with poplar and gumwood. An open-grain wood, such as oak, should not be covered, and this goes for fir plywood, too, as it has been found difficult to sand fir wood to a smooth enough working surface because of its pronounced grain. Hardboard is another excellent material to cover, as also is glass.

Preparing the surface: Needless to say, surfaces to be covered should be perfectly smooth and free of flaws, as the tight bond of the veneer, when cemented in place, only tends to emphasize any surface blemishes. Therefore, it is important to sand the surface carefully, and to fill all dents with wood putty. Although veneer has a lacquer base, the surface to which it is applied may be sealed with shellac, varnish or lacquer, applying it with either a brush or a spray gun, Fig. 1. When dry, this is rubbed down until smooth with fine sandpaper. If you are covering old furniture and the finish is in fairly good condition, an additional sealer is not necessarily required, but any wax on the surfaces should be removed with turpentine. However, if the finish is badly checked, it must be removed down to the wood, which is then sanded and sealed in the way that has been explained.

Steps in application: Plastic veneer is exceptionally easy to apply. As shown in Fig. 2, a razor blade and a metal straightedge or rule are used to cut the veneer. Then, after





the veneer is cut to the proper size, the paper backing is removed by soaking in water, Fig. 3. If a large sheet is being used, the bathtub provides an ideal place. Soaking the backing requires only a few minutes. Next, the cement is applied to the wood surface with a small sponge as shown in Fig. 4, swabbing it liberally over the area to be covered at the moment, and then excess water is drained from the veneer by holding up the sheet momentarily. When placed on the cement, you'll find that the veneer can be shifted easily in order to position it, and that you can take your time. A soft-rubber block, rubbed like a squeegee, is used to smooth out any wrinkles in the veneer, Fig. 5, and to remove the excess water and cement. This is done lightly at first and then more firmly, but not hard, when the veneer is in its final position. It

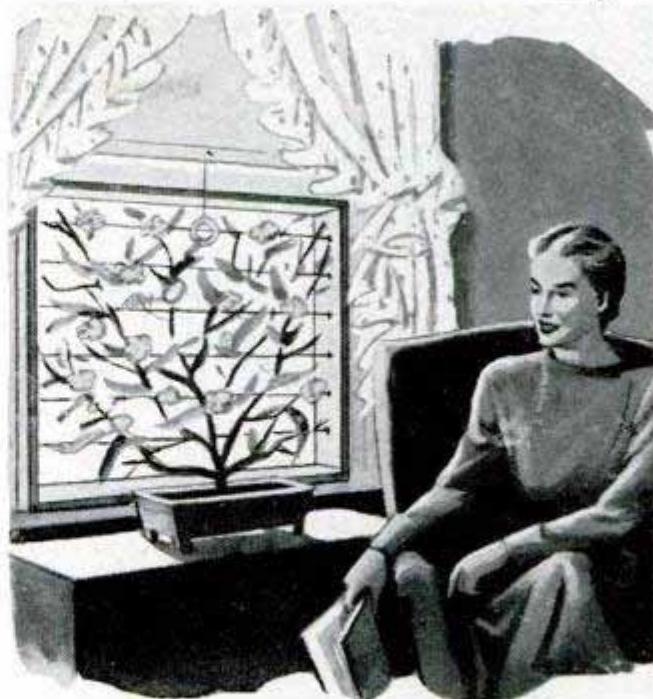
is important to wipe up immediately any cement that is squeegeed out from under the veneer and to wipe lightly the entire surface of the veneer with a dampened sponge to remove a possible film of cement. If any air bubbles appear under the veneer which cannot be worked out by squeegeeing, simply prick them with the corner of the razor blade and press down. Panels of veneers to be surrounded by a border are applied first. In adding borders, which generally are mitered at the corners, cut the veneer to width, soak off the backing, place the veneer on the work and miter the ends while the material is wet. Detail A, Fig. 7, shows how the ends of the border strips are lapped for cutting through both thicknesses at one time. This method makes a perfect-fitting joint. A similar method is used in matching and joining veneers, the veneer being lapped, detail B, and then cut as shown in detail C. In covering a large area, such as a table or desk top, half of the veneer is cemented in place at a time. First, the veneer is positioned, then half its length is folded back, detail D, cement is applied to the surface and, finally, the veneer is squeegeed. The same is done for the opposite half, detail E. Here the large squeegee will come in handy, although the small rubber block will serve in most cases.

Constructing the sample projects: Construction details for the projects pictured in full color are given in Figs. 8 to 12 inclusive in case you want to duplicate any of them. Several additional pieces will be pictured and detailed in Part II. All the projects were constructed primarily of poplar plywood, although hardboard can be used to cover the top and base of the square cocktail table. The top of the table was finished with marble veneer called Rose de Brignoles, while the base was done in Carpathian elm. Black-and-gold marble veneer was used in covering the book ends, and, in the case of the lamp, the base was done in mahogany stump to contrast with the straw-colored stump on the column. The 16-in. TV console has doors of crotch mahogany to stand out against a base of mahogany-colored Carpathian elm and a cabinet of fiddleback mahogany. Rose de Brignoles and Macassar ebony were combined to cover the large jewel box, while rhododendron and Macassar ebony were used on the other box.

Little need be said about construction as the drawings are self-explanatory. The column of the lamp, of course, is glued up from several pieces of solid stock. An important thing to remember in building the TV console is to fit and shape the doors as a single panel, which is cut slightly oversize in width, and then rip it down the center.

(To be continued)

Unusual Trellis Inside Window Provides Decoration and Privacy

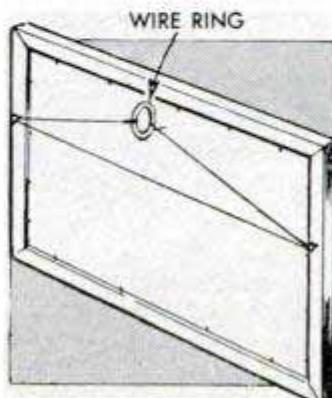


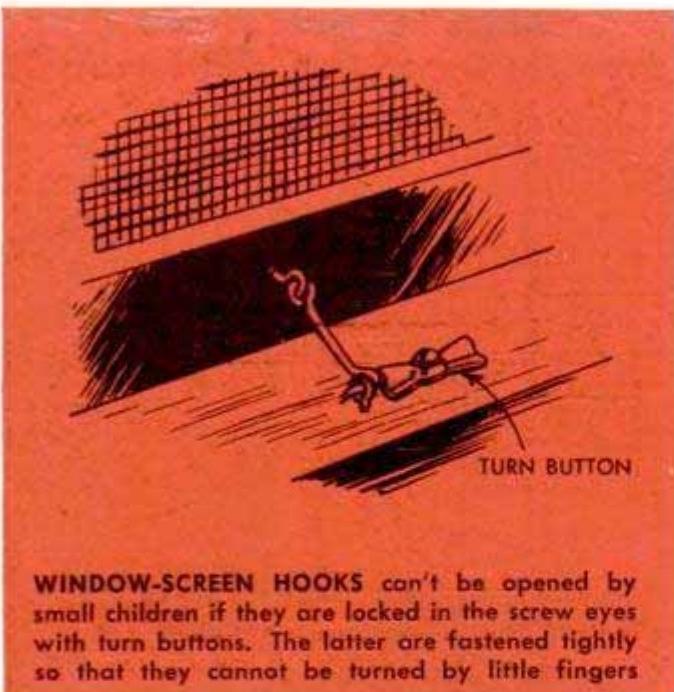
If a window in your house is directly opposite one of the neighbor's windows, you can achieve a considerable amount of privacy without drawing the blinds completely by utilizing this indoor trellis which allows entrance of both air and light through the lower half of the window. In addition, the trellis provides a year-round decorative treatment for a window that overlooks an undesirable view. The trellis is a wooden frame strung with fine wire, the frame being made two or three inches lower than the top rail of the bottom sash. This is done so that the fingers can grip the underside of the rail when it is desired to raise the lower sash. A single length of wire may be threaded through a series of holes drilled in the frame uprights, or individual strands of wire may be used, tying them between nails or screw eyes driven into the inside faces of the uprights. The frame is screwed or nailed lightly to the window casing and a vine is trained to climb over the trellis.

Dorothy S. Wade, Geneseo, N. Y.

Picture Frame Hung From Ring

Wall-hung picture frames are easy to straighten if the picture wire is slipped through a screw eye at each end of the frame and tied to a wire ring. Hung by the ring, the picture is merely moved from side to side to straighten it.



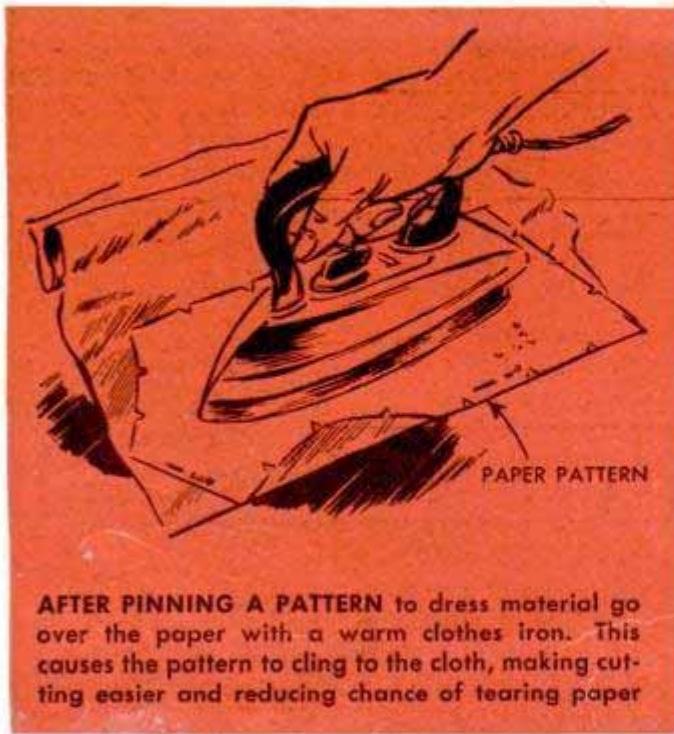


WINDOW-SCREEN HOOKS can't be opened by small children if they are locked in the screw eyes with turn buttons. The latter are fastened tightly so that they cannot be turned by little fingers



REMOVING YELLOW STAINS from ivory piano keys is done easily with a mixture of powdered chalk and alcohol. Mixed to a pasty consistency, the abrasive is simply rubbed over the piano keys

Solving HOME PROBLEMS



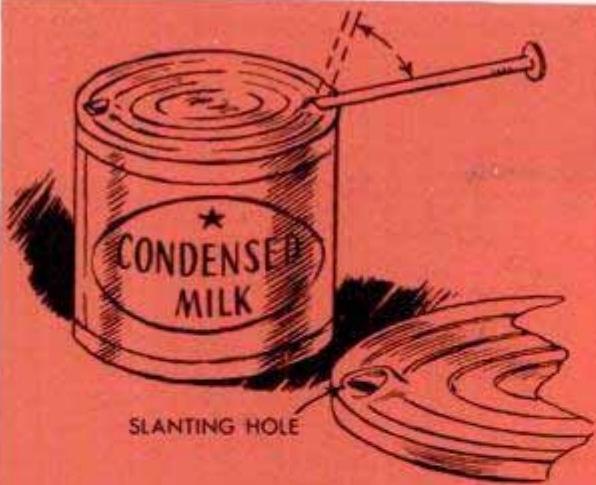
AFTER PINNING A PATTERN to dress material go over the paper with a warm clothes iron. This causes the pattern to cling to the cloth, making cutting easier and reducing chance of tearing paper



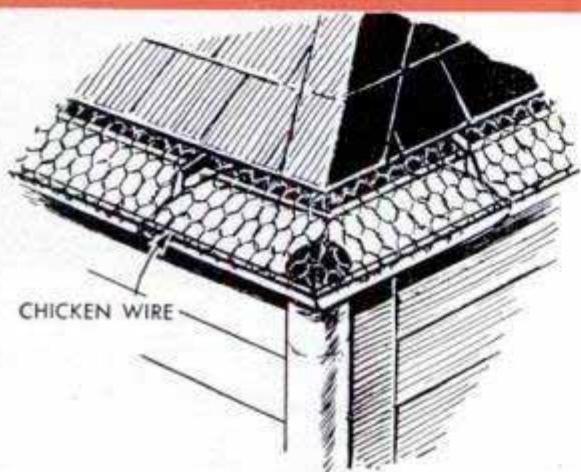
NONDRIP JACKETS for the bottoms of cold-drink glasses are improvised quickly from paper napkins. Fold the corners of the napkin up around the glass and secure them with a rubber band



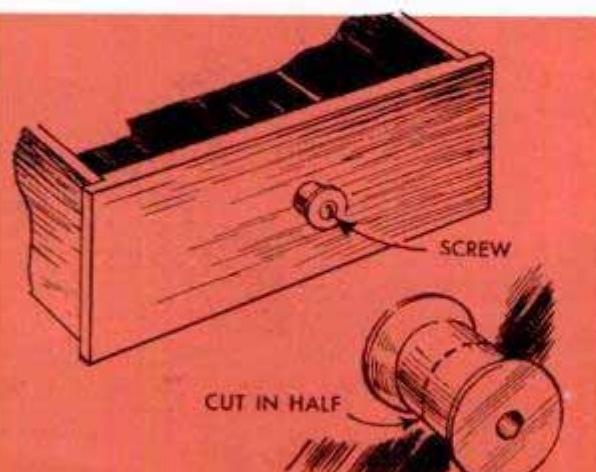
WHEN DRYING CLOTHES on a wire coat hanger, you can keep the hanger from rusting and staining the clothes by wrapping the wire with cellulose tape. Wrap the tape spirally around hanger wire



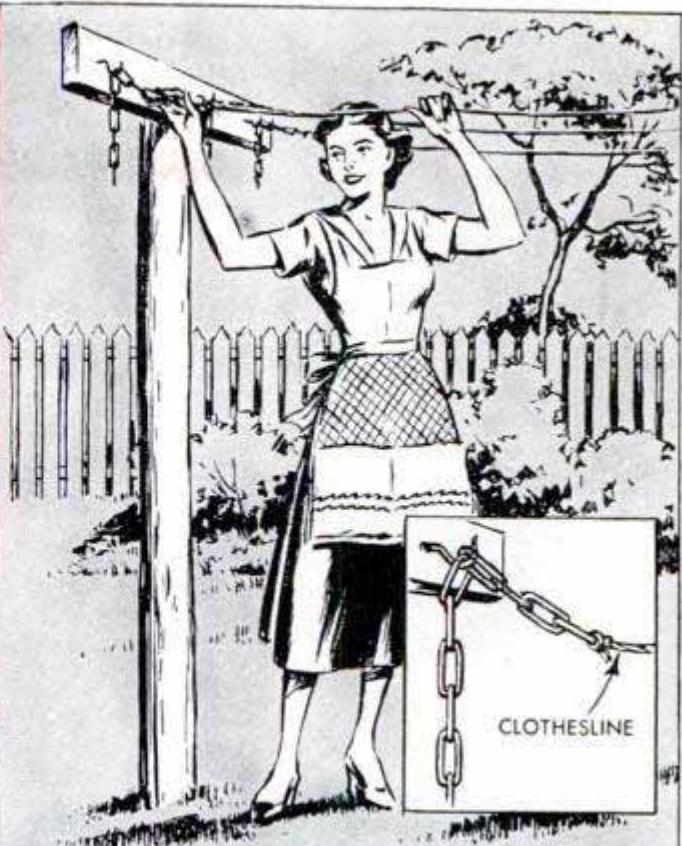
CONDENSED-MILK CANS will not be sealed with a film of dry milk if they are punched with a nail which is brought downward, as shown, before removing. Forming the hole in this way allows milk droplets to drain back into the can



CLOGGING OF THE EAVES TROUGH will no longer be a problem if you cover the trough with chicken wire. Cut the wire in strips, bend one edge to hook over the rolled bead of the trough and tack the other edge to the roof



DRAWER AND DOOR PULLS for workbenches and utility cabinets are made inexpensively from wooden thread spools. Each spool is sawed in half, thus providing two pulls which are fastened with roundheaded bolts or wood screws

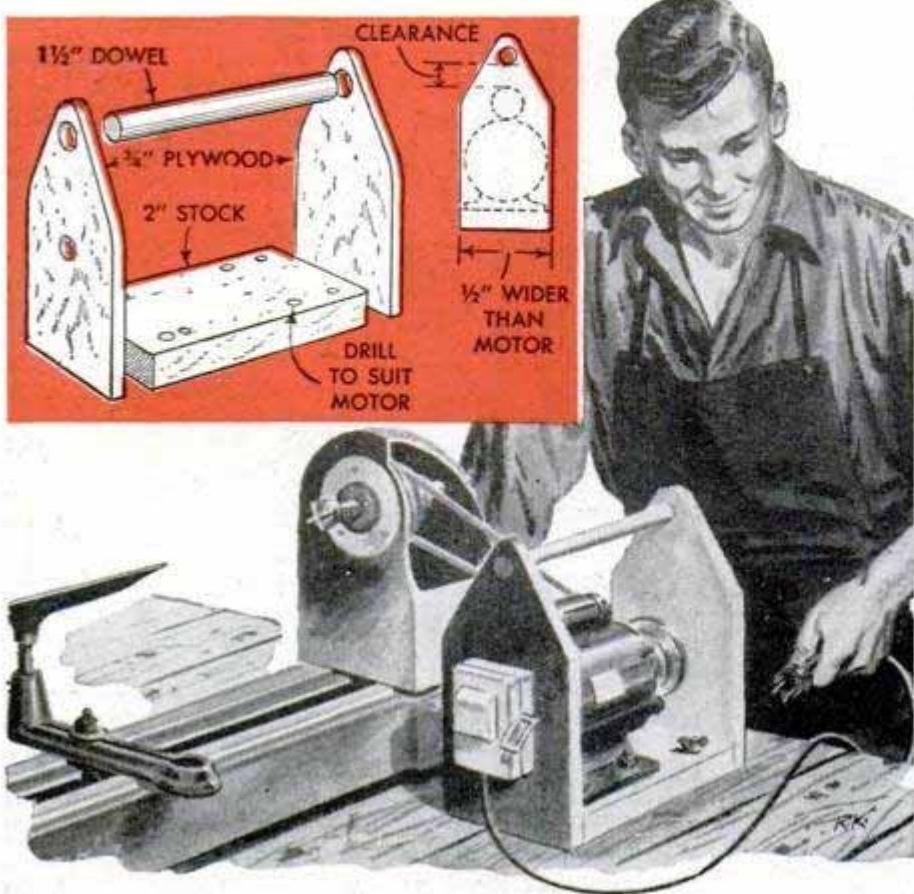


SLACK IN A CLOTHESLINE caused by stretching is easy to take up if a short length of chain is tied to one end of the line. Drawing up the chain a link or two over the hook will quickly tighten the line

STANDING FOR HOURS at an ironing board is no fun, especially if ironing is done in the basement. To make the job less tiring, buy a rubber floor pad and use it to cushion your feet on the concrete floor



Portable Mounting Block for Home-Shop Motor Is Fitted With Handle to Facilitate Carrying



It's easy to drive all your power tools with a single motor if the motor is mounted on this basket-type carrying case. The bottom of the case serves as the mounting block for the motor. This is drilled for bolting to the workbench or tool stand. A length of dowel fitted in holes drilled in the ends of the case provides the handle. Note that the motor is wired to a switch which is fastened to one end of the case so that an extension cord from the switch box can be plugged into a convenient outlet. For quick changing of the motor from one tool to another, set bolts permanently in the bench top or stand, spacing them to align with the holes in the motor mount. Then fasten the mounting block with wing nuts.—P. Gardner, Seal Rock, Ore.

Uneven Painted Surfaces Are Leveled Quickly by Softening and Scraping

Leveling the surface of old painted wood-work which is uneven as a result of paint runs often can be done more quickly by scraping than by sanding. First, apply paint amalgamator, or softener, to the surface with a saturated cloth. The amalgamator merely softens the finish and does not lift or harm the paint. As soon as the paint

softens, scrape it in the direction of the run, using a metal paint scraper or a piece of glass having a straight edge. Immediately after scraping, wash the surface with a strong soda solution or other neutralizer recommended by the manufacturer of the amalgamator.

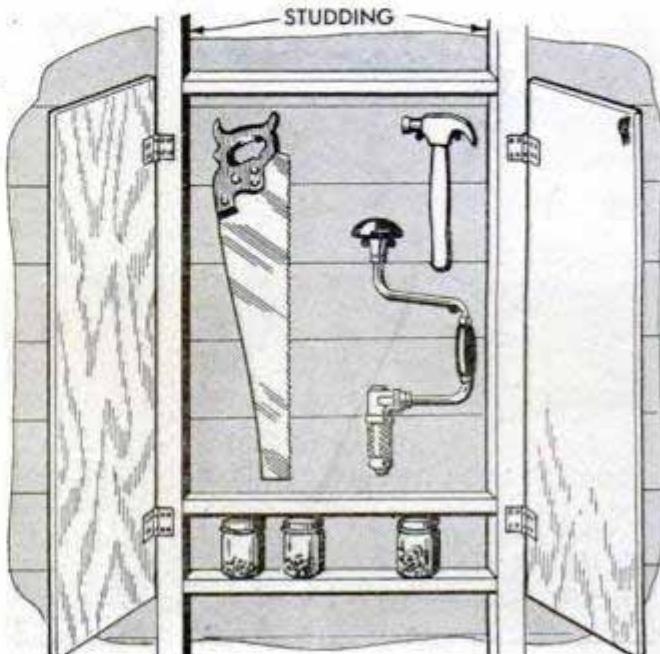
Andrew Brennan, Philadelphia, Pa.

Tool Cabinet on Garage Wall Utilizes Studs as Side Members

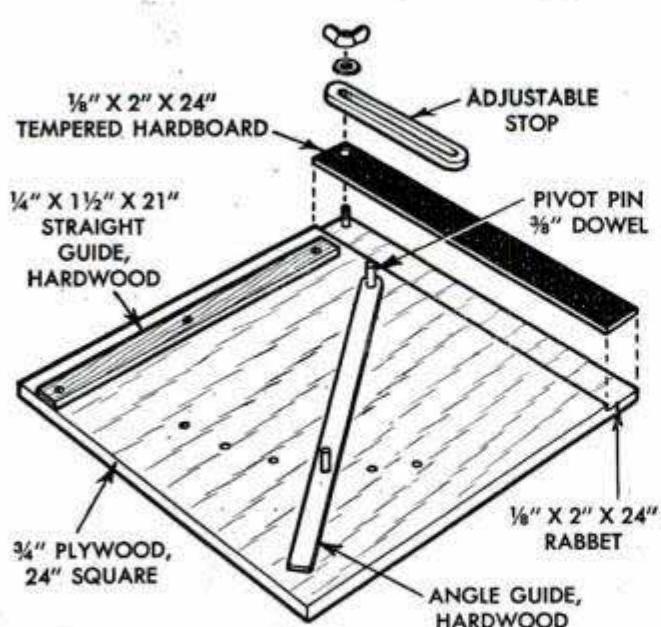
If limited space makes storing hand tools a problem, use the wall area between the studding in the garage to form the back and sides of one or more tool cabinets. The tools are hung from nails driven into the siding, while small parts such as nails and screws are kept in jars which are set on shelves mounted between the studs. Panels of plywood hinged to the studs form a double door for the cabinet, this arrangement requiring less space for opening the cabinet than if a single panel were used. If a more elaborate cabinet is desired, small drawers of plywood or sheet metal can be inserted between two shelves. A regular friction catch is used to hold the doors shut.

Hugh Lineback, Stillwater, Okla.

A large sponge is handy for wiping cosmetics and water from the bathroom floor.



Make This Trimming Board for Cutting Veneer



If it's your first attempt at veneer marquetry, take time to make a cutting board. Not only will it speed duplicating in quantity the many small pieces required, but the board will be a great help in making accurately fitting joints. The primary need in the way of tools is a keen-edged veneer knife and a carpenter's framing square. The cutting board shown in the illustration has proved adequate for average work. It is made from a 24-in. square of $\frac{3}{4}$ -in. plywood with one end rabbeted so the cutting surface can be renewed by inserting a narrow strip of tempered hardboard whenever it becomes badly scored by the knife. A narrow hardwood straightedge is mounted at the top of the board as a stop for the square and the work when making right-angle cuts.

In cutting angles of various degrees, for

5, 6 and 8-sided patterns, an angle guide is made from a narrow piece of hardwood, pivoted at one end with a $\frac{3}{8}$ -in. dowel and drilled near the opposite end for a dowel locking pin. Various angles are accurately laid out and holes are drilled to receive the pin. With the work set at the desired angle against the guide and the steel square laid over it, as in the illustration, duplicate parts may be cut in any quantity. The adjustable cutoff stop is made from a narrow strip of $\frac{1}{4}$ -in. plywood with a $\frac{1}{4}$ -in. slot cut in its center. This is clamped in position by a bolt, washer and wing nut and is used in cutting duplicate parts to the same length. Veneer is usually sold in a "deal," this being a package containing from 10 to 100 square feet of veneer, 6 to 12 in. wide and 24 to 36 in. long. A deal usually contains 6 to 12 kinds of wood.

Brass Beds Provide Railing Around Outdoor Stair Well

Simulating expensive wrought iron, this attractive outdoor railing utilizes the head and footboards of old brass beds to en-



close the side and end of a basement stair well. As the brass is readily cut with a hacksaw, any undesirable decorative treatment can be removed easily and the legs cut off to attain the same height for all sections of the railing. The legs are embedded in holes chipped in the top of the stair-well wall and then filled with concrete. Holes are drilled in the brass posts to permit joining the railing sections with bolts or lengths of rod. Note that one end of the railing is fastened to the wall of the house and the other end is supported by an angle brace embedded in the concrete of the stair well. After assembly, the railing is coated with a rustproofing compound and finished with black enamel.

V. K. McCuaig, Vancouver, B.C., Can.

Sawbuck Made From Oil Drum Is Weighted With Sand



A sturdy sawbuck for cutting firewood is fashioned easily from a 55-gal. oil drum. First cut away the upper portion of the drum, including a few inches of the sides, and then cut V-notches in opposite sides of the drum, making the bottoms of the notches reach approximately the center of the drum. Before using the sawbuck, fill the drum with sand or dirt to weight it sufficiently to prevent its moving or tipping over while sawing. Besides cradling the work, the sharp edges of the V-notches tend to bite into the log to prevent rolling. Even when filled with sand, the drum can be rolled for short distances but, if it is emptied, the drum can be carried by hand or hauled in a pickup truck wherever it is needed and refilled at the new location.

A. H. Waychoff, Phoenix, Ariz.

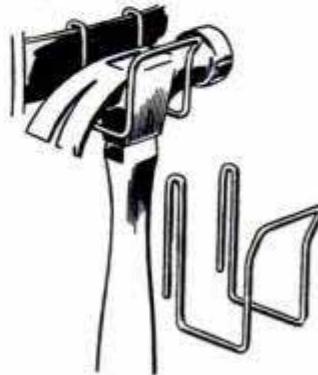
the spot welds. Then a disk cut from a block of wood is drilled and slipped over the bushing, the disk being of a size that will fit within the hollow formed by the dished center portions of the sheet-metal disks. After setting the tire in place on the flange, bolt the two sheet-metal disks together as before. If desired, drill the metal disks and fasten them to the wooden disk with screws.

C. P. Cabell, Richland, Wash.

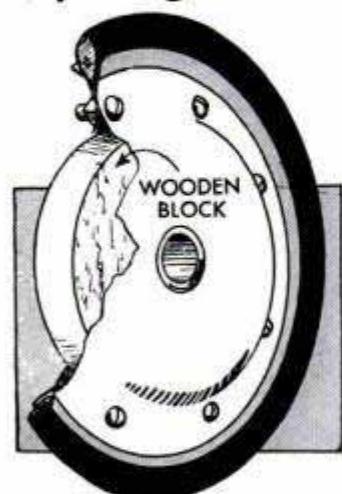
Belt Clip of Bent Wire Holds Claw Hammer

Bent from stiff copper wire or a section of wire coat hanger and hooked over your belt, this holder provides a handy means of carrying a hammer when doing carpentry work. It receives the hammer more easily than the conventional overall loop and can be quickly removed from or attached to the belt.

C. P. Howe, Saranac Lake, N. Y.



Repairing Coaster-Wagon Wheels



Light-duty wheels on coaster wagons and garden carts sometimes fail because of excess weight breaking the spot welds which join the sheet-metal disks. If neither of the disks has torn away from the bushing, the wheel can be repaired by drilling a series of holes all around

the wheel near the tire and bolting the two disks together. However, if one of the disks has torn away from the bushing, it should first be removed completely by breaking

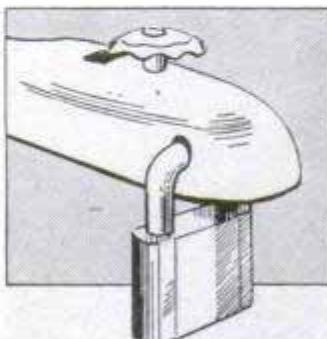
Painting Corroded Fishing Reel

Corrosion on a fishing-reel spool will quickly discolor and eventually rot any line that may come in contact with it. If it is not practical to have a corroded spool chrome plated, coating the spool with aluminum paint is the next best thing, as it will provide a finish that lasts for a full season. Clean the spool thoroughly with steel wool or fine sandpaper and roughen the remaining portions of the original chrome plate. Then mix aluminum powder or paste in clear lacquer and apply to the entire surface of the reel spool.

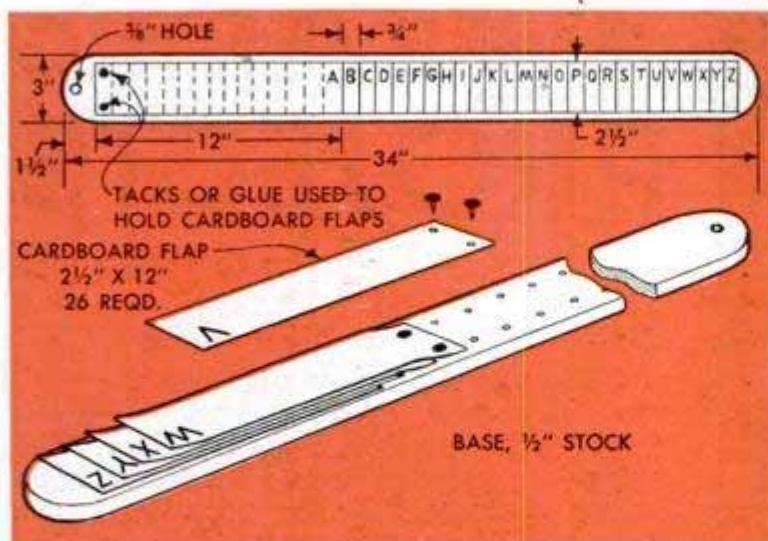
Clinton R. Hull, Costa Mesa, Calif.

Padlock for Trailer Hitch

Owners of trailers who must leave them unattended can discourage thieves from towing away the trailer by padlocking the hitch socket. Drilling one side of the socket and fitting it with a padlock makes it impossible to slip the socket over the ball hitch without removing the lock.—Ira A. Minor, New York City.



Desk-Top File Aids in Sorting and Indexing



Sorting and arranging file cards, address cards, or clippings in alphabetical order is done in a jiffy with this simple filing aid. It consists of a base strip of $\frac{1}{2}$ -in. stock rounded at the ends and sanded smooth on both sides. As detailed, this base strip is 34 in. long but, of course, the length can be varied to suit the purpose. Next, 26 flaps, or strips, are cut from cardboard and lettered alphabetically as indicated, a single letter being placed in the upper right-hand corner of each flap. The flaps are then tacked to the base in the order and spacing indicated.

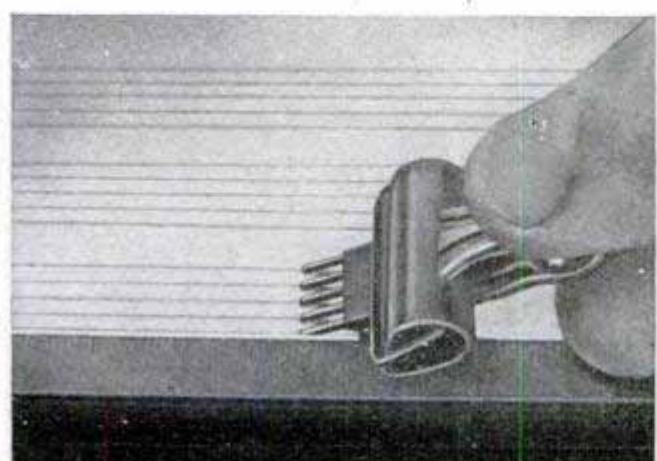


Paper Clip Holds Pencil Leads to Form Music-Staff Writer

Conveniently carried in the pocket or handbag, this music-staff writer is just the thing for quickly ruling ordinary typewriter paper. After cutting a strip of $\frac{1}{2}$ -in. photo or cellulose tape 2 in. long, break five refill leads for an automatic pencil into $\frac{3}{4}$ -in. lengths. Then place the leads on the gummed side of the tape, inserting $\frac{1}{2}$ -in. lengths of lead between them to serve as

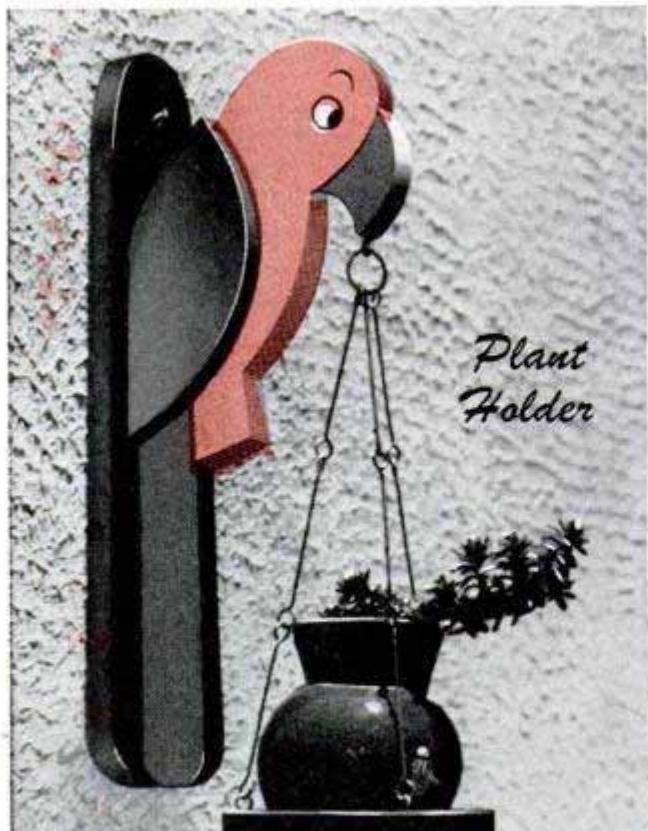
spacers. Be sure that all the leads are aligned with the top of the tape so that the five $\frac{3}{4}$ -in. leads will project exactly the same distance. Fold the tape over the top portions of the leads and then clamp the taped section in a spring-type paper clip. Use a straightedge when drawing the music staffs and do not bear down too heavily on the leads as they are liable to break or shift position. When not in use, reverse the leads in the clip so that the ends are protected and will not be broken.

John J. Rea, Urbana, Ill.

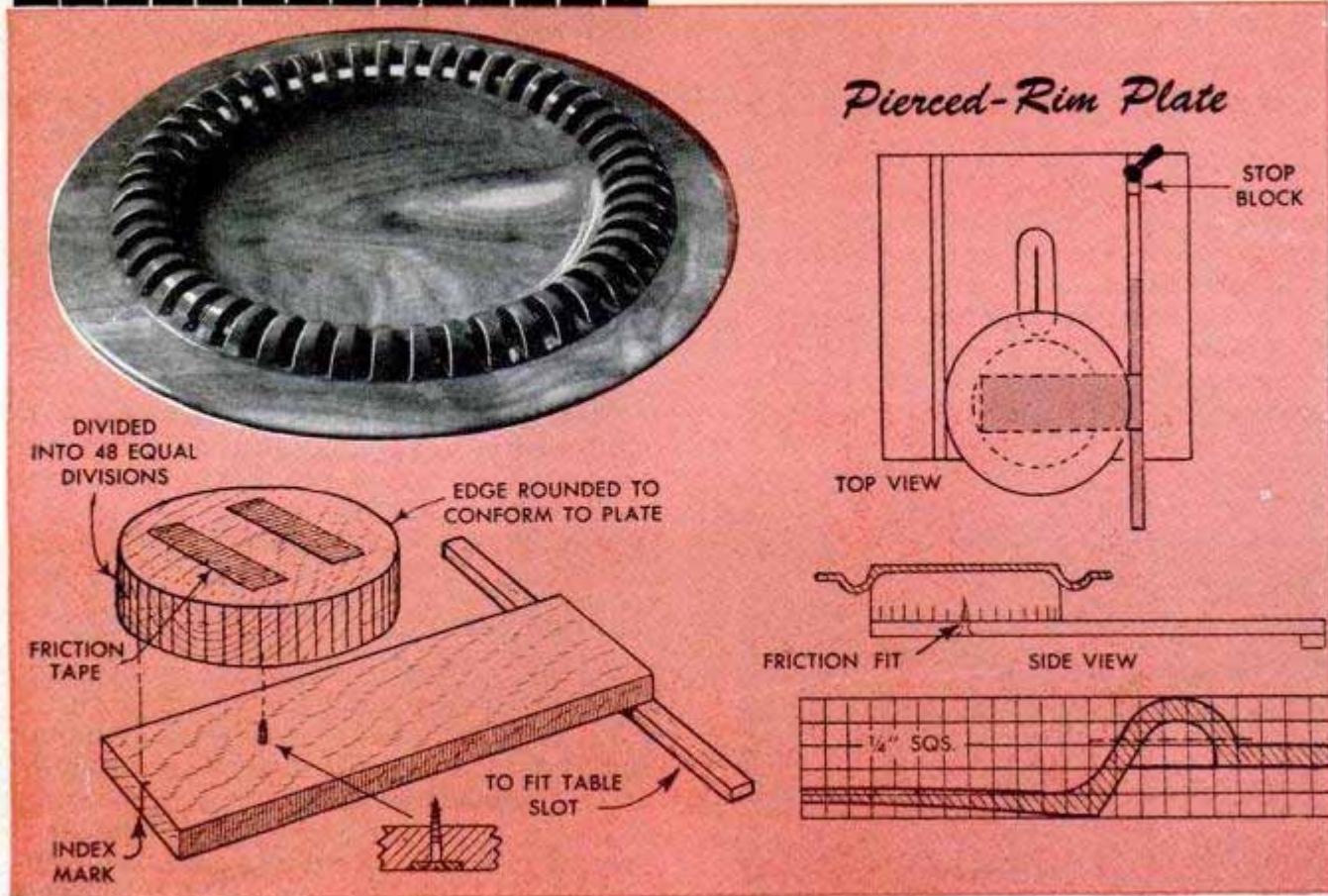
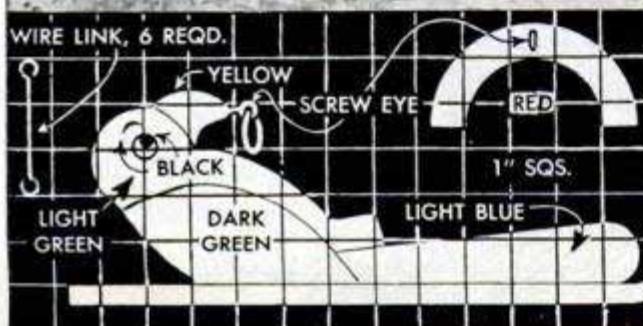


Shellac Painted Over Tree Scars

After removing dead or diseased branches or dry rot from a tree or shrub, apply several coats of orange shellac over the open wound before applying cement or other material for a permanent covering. Because of its nontoxic qualities, shellac is recommended for preventing attack of fungi and oxidation on newly cut tree scars.



Plant Holder



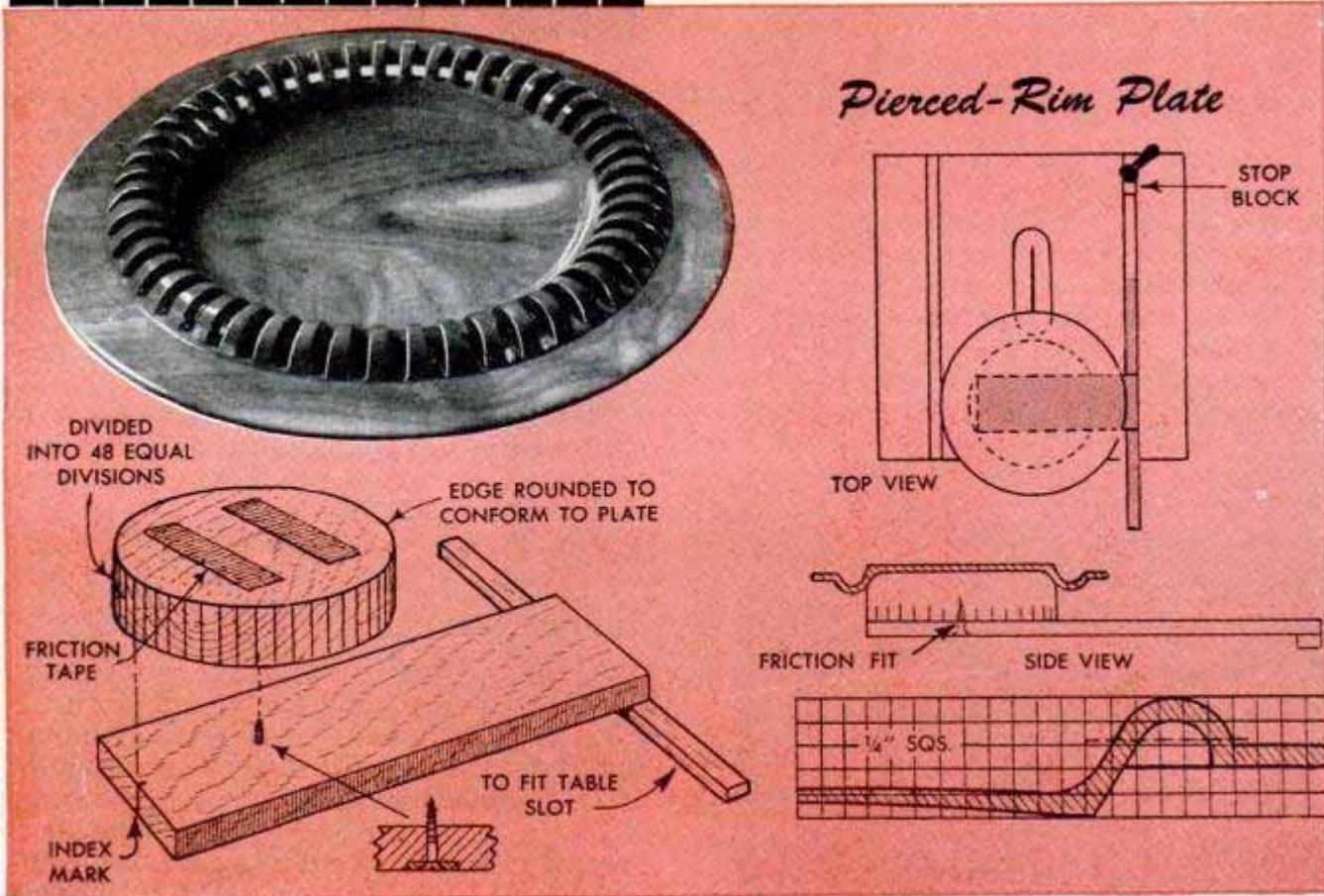
1 EVENING PROJECTS

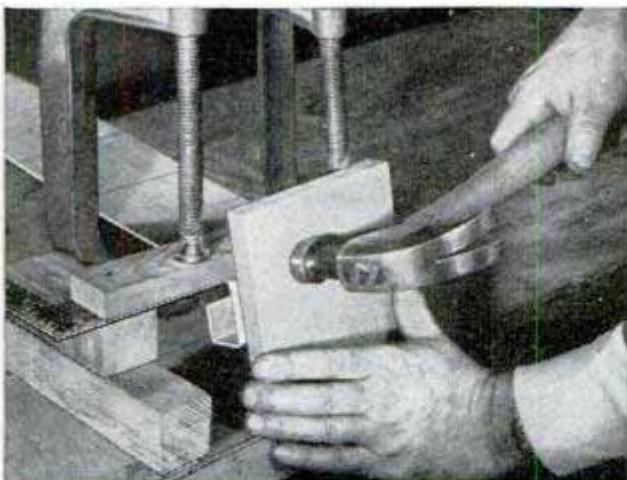
PLANT HOLDER

Gaily painted and mounted on the wall, this handsome parrot provides a novel bracket for hanging a potted plant. The wings are glued and bradded to the body which is fastened to the backboard with screws, all the parts being made from $\frac{1}{2}$ -in. stock. The planter rests on a wooden ring which is hung from the parrot's beak with either six or nine wire links, depending upon their length.

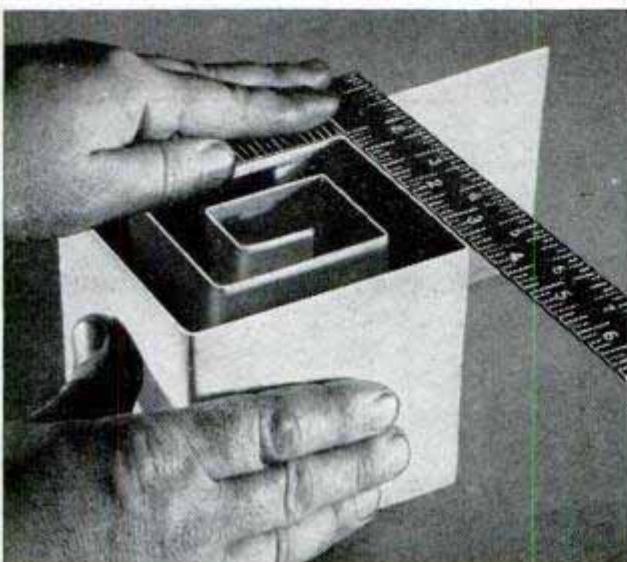
PIERCED-RIM PLATE

Designed for candy, hors d'oeuvres or fruit, this hardwood plate is an exceptionally interesting craft project. Mount a 12-in. disk, $1\frac{1}{4}$ in. thick, on the lathe faceplate and turn to form the bottom of the plate. To reverse the disk for turning the top, glue a scrap block to the bottom, placing paper in the joint. After turning, remove the scrap block and then cut slots through the raised rim, using the index guide as





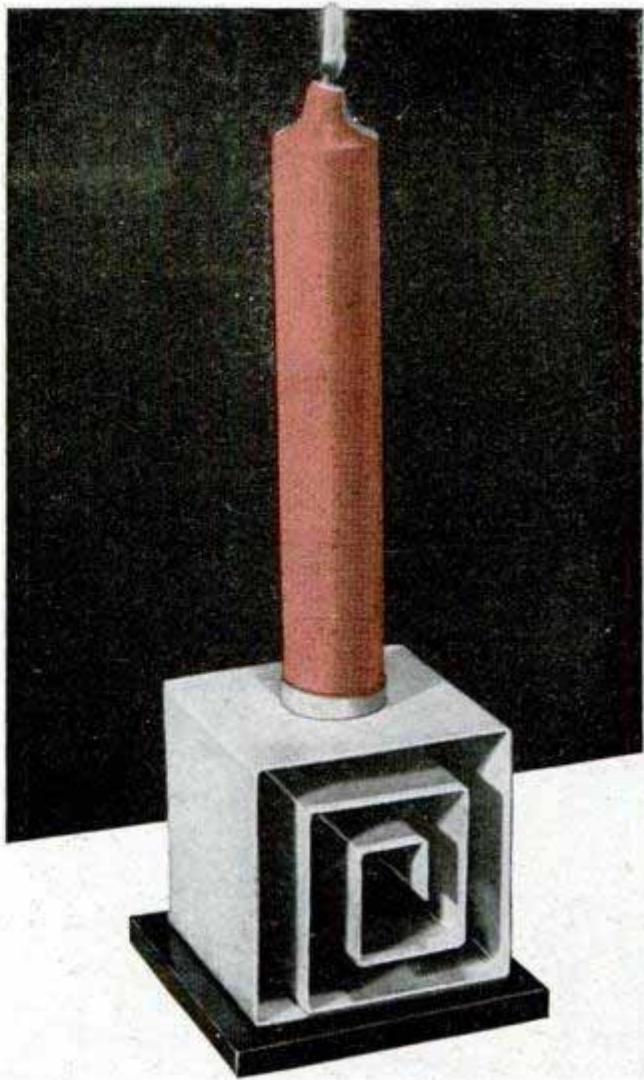
The metal is clamped between a framing square and a wooden block to provide a hard edge for bending



Above, before making the final bend for the overlap, check each of the bends with a square. If they are not at right angles, correct them by springing the metal by hand in the necessary direction

Below, left, spice-jar cap is cemented to the top of the bent-metal block to receive the end of the candle. Be sure to select a cap that will hold a candle of the size which you are intending to use

Below, right, when the aluminum has been bent it is cemented to a 4½-in.-sq. wooden base, centering it evenly. Note that the cement is spread in a spiral on the overlapped portion of the sheet-metal block



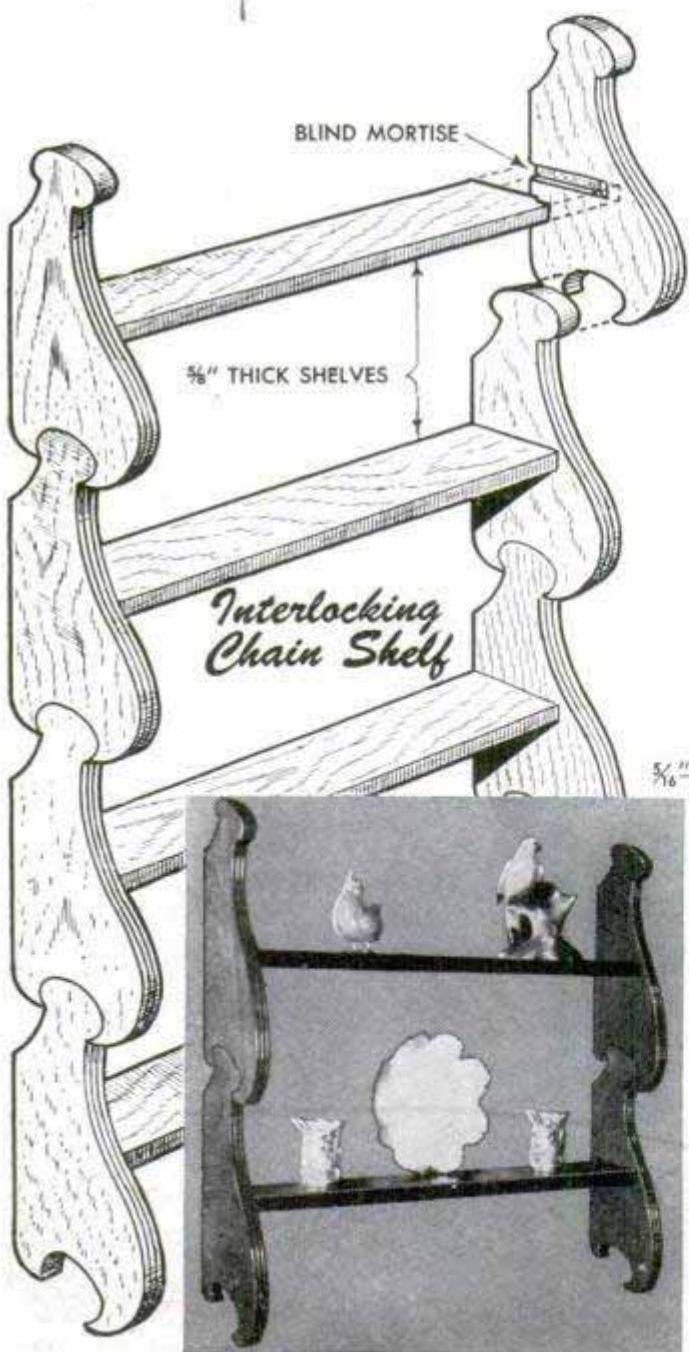
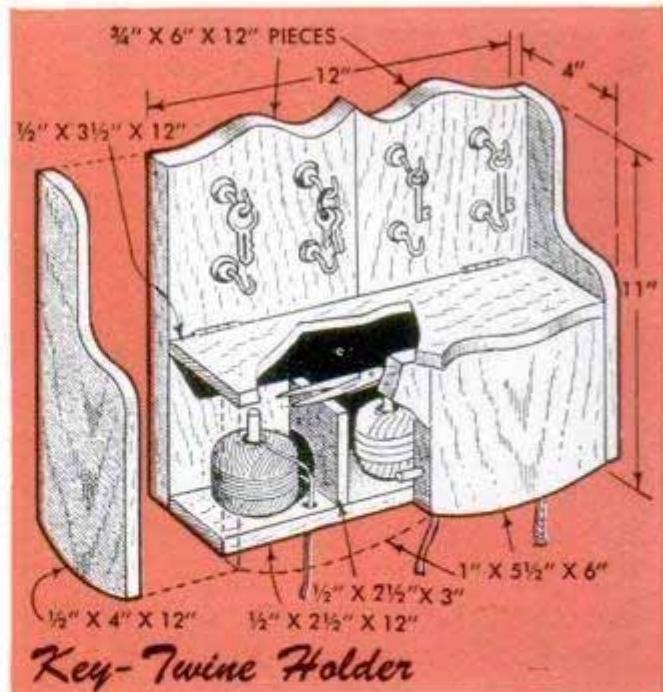
Chinese-Modern Candlestick

shown. With the plate set on the guide, the rim cuts are equally spaced by aligning the division lines on the edge of the guide with the index mark. A dado head is used to make a $\frac{1}{4}$ -in. cut $\frac{1}{2}$ in. deep.

MODERN CANDLESTICK

Bent as shown and mounted on a wooden base, a 4 x 33-in. strip of aluminum provides a striking modern candlestick. Lay out the strip for bending by marking guide lines across the metal at right angles





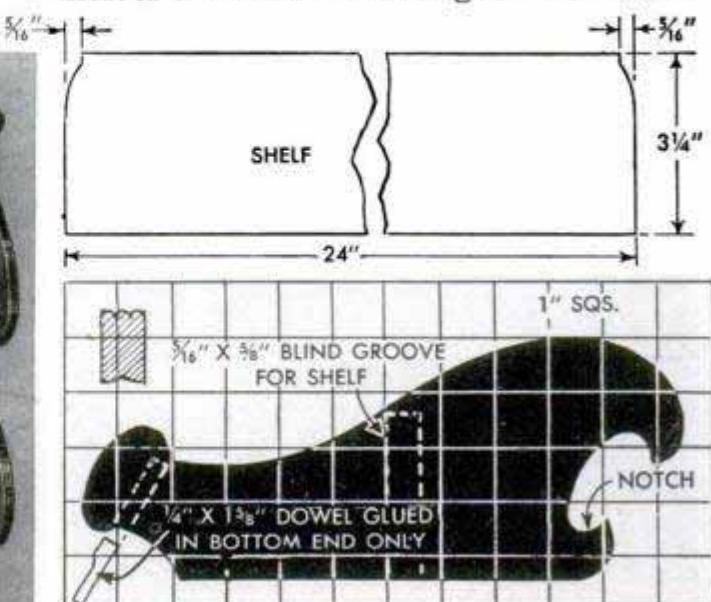
to the edges. Draw the first line 1 in. from the end and mark the succeeding lines the following distances apart: 1 in., $1\frac{3}{4}$ in., $1\frac{3}{4}$ in., $2\frac{1}{2}$ in., $2\frac{1}{2}$ in., $3\frac{1}{4}$ in., $3\frac{1}{4}$ in., 4 in., 4 in., 4 in., and 4 in., the final 4 in. providing the overlap for the cemented joint.

KEY-TWINE HOLDER

No more mislaid keys, and a supply of twine when you need it, are the advantages of this key-twine holder. The back and front members are each made up of two pieces doweled and glued together. There's room for scissors under the lid, which covers compartments that hold the twine.

INTERLOCKING SHELF

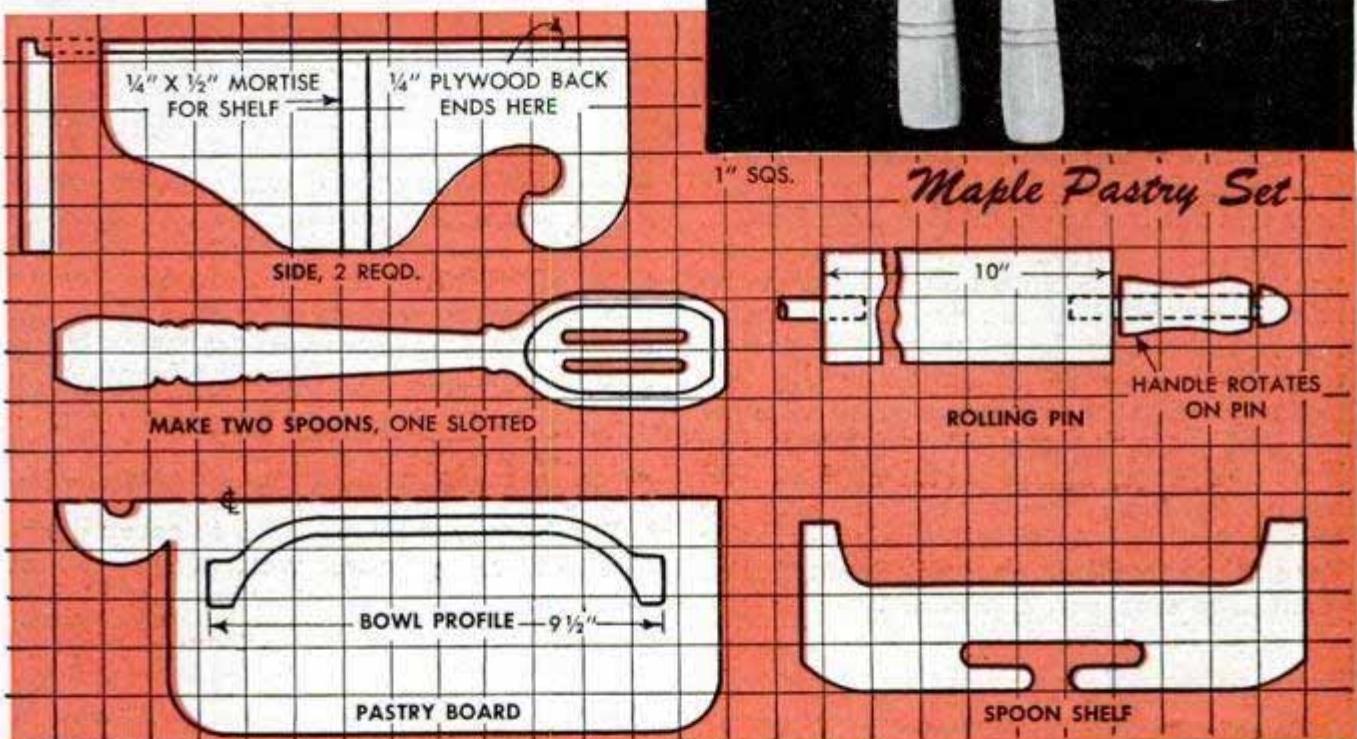
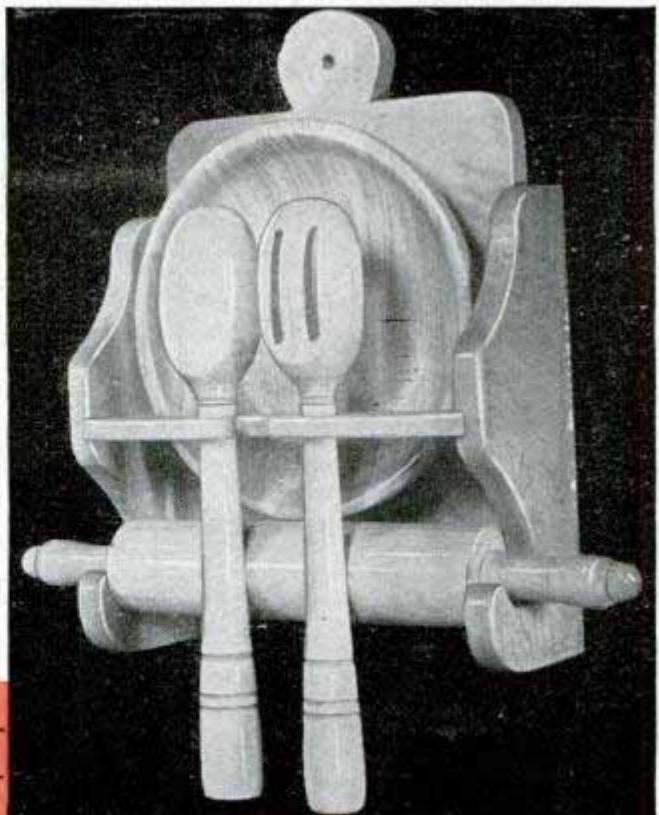
The unique feature of this shelf is that one section can be used alone, or, if preferred, four or more sections may be mounted one under the other. As the sides of the shelf are identical, they may be cut out in multiple. The front corners of the shelves are cut to overhang blind mortises



in which the ends of the shelves are glued. One side of each shelf is edge-drilled for a dowel as in the squared pattern. Except for the end of the dowel which is glued in the bottom of the hole, about two thirds of the thickness of the dowel is cut away. This allows the dowel to be pressed downward while the shelves are interlocked, after which it springs upward to engage a half-round notch made in the adjoining shelf members. To remove the shelves, disengage the dowel with a knife blade.

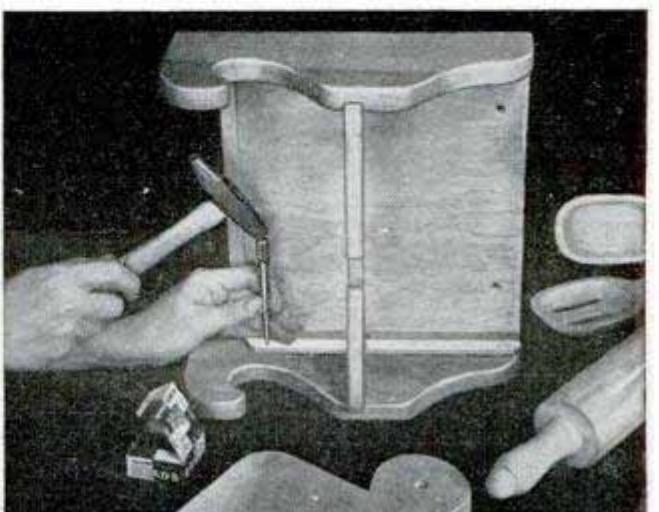
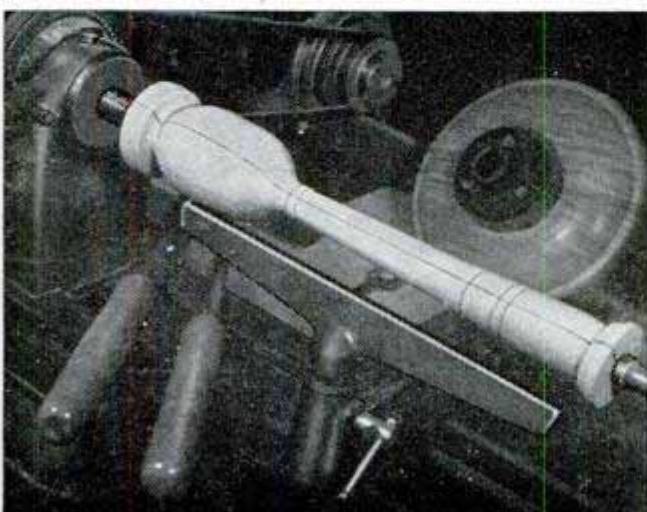
MAPLE PASTRY SET

This pastry set includes rolling pin, two mixing spoons, pastry board, mixing bowl and a wall rack that holds the entire set. The sides of the rack are cut as shown in the upper detail and rabbeted to take a $\frac{1}{4} \times 9\frac{3}{4} \times 10\frac{1}{2}$ -in. plywood back.

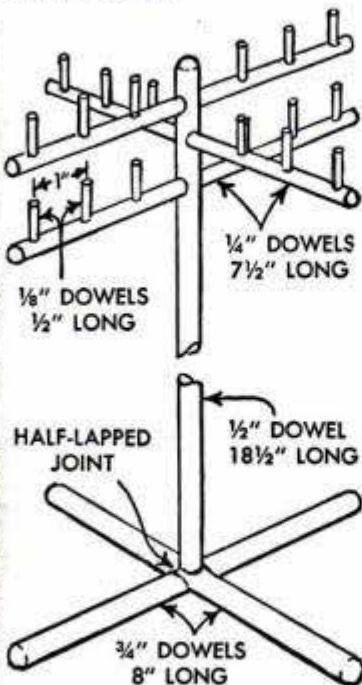


The photo below shows the split turning for the spoons in its final stages. Two pieces of stock were glued together with a sheet of paper sandwiched between them to facilitate separation after turning on lathe.

Channels for pastry board are made by fastening cleats to the wall rack with brads, as in the picture below. Note the cleat along the lower edge of the plywood back which forms a rest for the pastry board.



Bow-Tie Rack Made of Dowels Simulates Telephone Pole



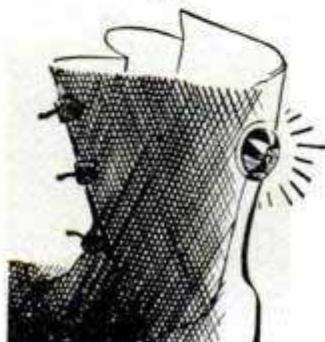
Set on the top of a dresser or bureau, this miniature telephone pole keeps your bow ties out in the open for easy selection. The upright, which is a length of $\frac{1}{2}$ -in. dowel, is set in a blind hole drilled in the half-lapped joint of the $\frac{3}{4}$ -in. base members. The three $\frac{1}{4}$ -in. arms are passed through transverse holes drilled in the upper portion of the upright, the center hole being at a right angle to the other two. Note that six blind holes for the spacer pins are drilled along the top of each arm before assembly. After all the parts have been glued together, the rack is stained or painted to suit.—A. E. Fenn, Chicago.

Estimating Weight Lost by Fish

To estimate how much weight a fish loses after being out of the water, figure a loss of approximately 1 oz. per pound in eight or ten hours after being caught. Thus, a bass that weighed 5 lbs. when caught would lose about 5 oz. in this length of time.

R. A. Jenkins, St. Louis, Mo.

Safety Reflectors on Overshoes Warn Approaching Motorists



If it frequently is necessary for you to walk down a highway at night and during bad weather when it is extremely difficult for approaching motorists to see you, fit your overshoes with jewel

reflectors, front and back, to warn motorists. Punch holes in the overshoe and mount the reflectors, placing strips of adhesive tape over the nuts to protect your clothing. The reflector screws should be cut off so they come flush with the faces of the nuts when tightened in place.

Top Overhangs Cabinet Back To Fit Against Wall

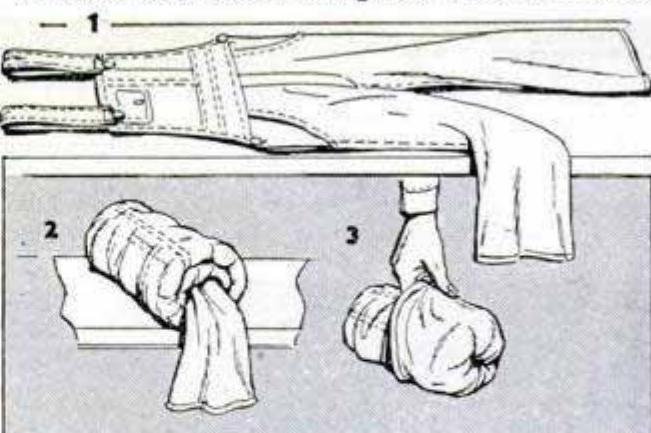
When building a chest of drawers, bookcase or other cabinet, cutting the top flush with the back usually results in a gap between the cabinet top and the wall of the room because of the thickness of the baseboard and quarter round. The chance of small items, such as pencils and cuff links, falling between the cabinet and wall can be eliminated simply by cutting the top to overhang the back of the cabinet so that it will fit tightly against the wall. In addition to the convenience gained in this way, the overhanging top gives the furniture a built-in look when viewed from the front.

Paul Will, Chicago.



Overalls Rolled Into Compact Bundle

Workers who are obliged to carry overalls to and from their work will find that they may be carried in a compact bundle without the use of straps or rubber bands.



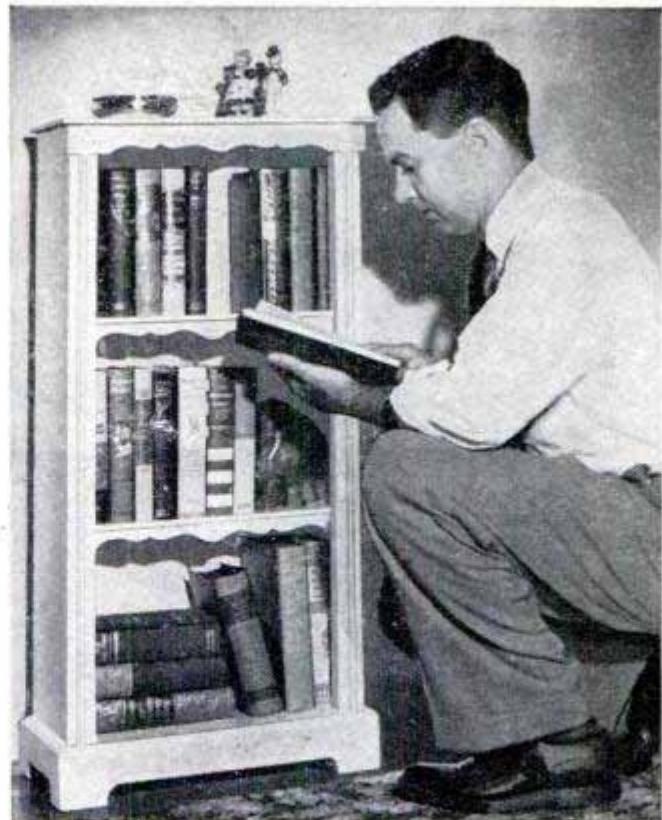
Merely roll up the garment as shown in steps 1 and 2, leaving half of one leg projecting. This portion is then pulled, inside out, over the rolled portion, step 3, to form a handle for carrying.

An area frequented by cockroaches can be painted with a mixture of lime, water and a small quantity of salt that will get rid of the insects for a few weeks.

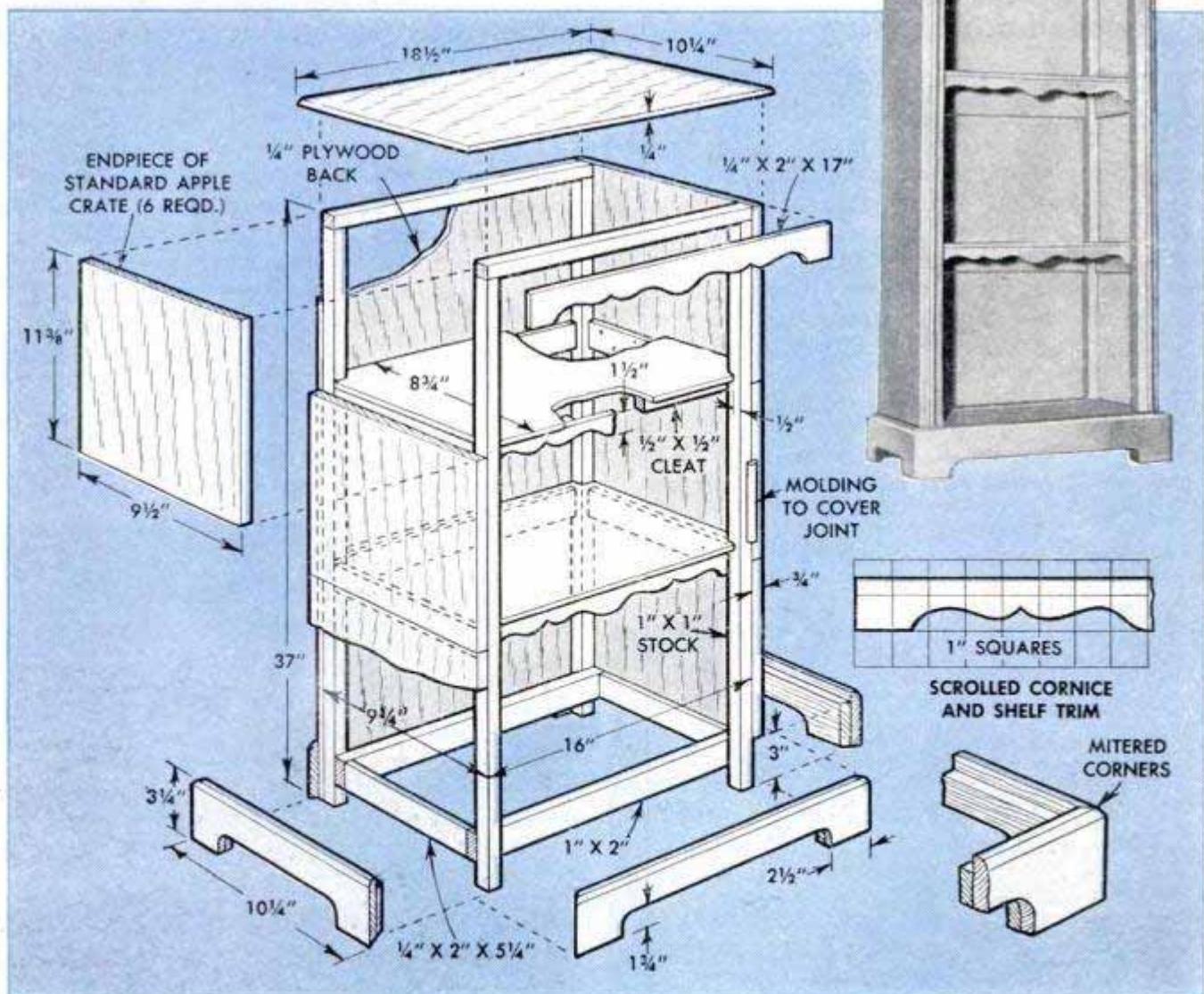
Colonial Bookcase From Fruit Crates

By A. J. Stephenson

NEARLY all the material used to build this colonial bookcase is obtained from discarded fruit crates. The standard apple crate is just the thing, as the $\frac{3}{4}$ -in. ends of the crate are used for the sides of the bookcase and the thinner stock, which forms the sides and bottom of the crate, is carefully salvaged and used for shelves. Three crate ends are assembled end-to-end with strips spanning each joint lengthwise and attached on the inside with screws and glue. The strips also serve as shelf cleats. The assembled sides are attached to a frame of 1 x 1-in. stock assembled as in the detail. Then the back and shelves are fitted and attached. The back is of $\frac{1}{4}$ -in. plywood taken from a packing case and the scrolls for the top and shelves are of $\frac{1}{4}$ -in. solid stock. The base is built up of two thicknesses of $\frac{3}{4}$ -in. stock mitered at the corners. Finish the job with a coat of primer and two coats of quick-drying enamel.



Scrolls and clover-leaf moldings add design details to this fine bookcase





BRING YOURSELF BACK ALIVE

By Raymond Schuessler

HUNTING is a relatively safe outdoor sport for anyone experienced in handling rifles and shotguns in the field, but many inexperienced shooters may, at the outset, adopt dangerous practices without being fully aware of the hazards involved, both for themselves and others. There are certain simple, easy-to-remember precautions that will enable hunters to avoid accidents in the field, whether they are hunting big game in the back country or shooting birds over dogs in a thickly settled

community. There also are some pretty important "don'ts"—things that good sportsmen and gun handlers don't do with a loaded shotgun or rifle anywhere, at any time.

Experienced shooters will make certain that a gun isn't loaded by opening the action, or unloading both chamber and magazine, before getting into a car, climbing a fence or handing the weapon to a friend for examination. Careful riflemen and shotgunners never aim loaded guns idly at near-by objects as the shooter is doing in the photo above—pointing his high-powered rifle at the hub cap of the car. Should the rifle be discharged in this position—and such accidents do happen!—one, or possibly both, of the shooters stands a good chance of being seriously injured by flying pieces of metal from the shattered hub cap, or by a dangerous ricochet of the bullet.

When two or more shotgunners become

Here's a dangerous situation—unless hunter in foreground holds his shot. Note man in the background

Photos courtesy Western Cartridge Company, Division of Olin Industries, Inc.



When hunting in pastures, never shoot near a herd of cattle. Gun shots may stampede them, causing injury





Both hunters are endangered by this accidental fall when walking single file. Note position of gun muzzles

separated while working thick, brushy bird cover they should be especially careful until contact is re-established or the exact whereabouts of each one has been made known to the other. Firing a shotgun in any direction at head level, or below, under such conditions can be extremely dangerous. Likewise, riflemen stalking large game animals, such as deer, in thick woods where clear vision is limited to a few yards, should always avoid shooting at moving objects which they hear but cannot, or, at best, only indistinctly, see. Many deer hunters are accidentally killed or seriously injured during each fall hunting season by other riflemen who fail to observe this precaution. The point is graphically illustrated by the lower left-hand photo on the preceding page. Here the second hunter, whose position is indicated by the arrow, is in grave danger of being shot and perhaps killed by the hunter in the foreground unless the latter holds his fire until he is certain of what it is that has attracted his attention, either by slight



Here's the same situation, but the fall occurred when guns were being properly carried, eliminating hazard

sound or movement in the distant cover.

Where it is necessary for two hunters to travel single file along a path or trail, the man in the lead should always carry his gun with the muzzle forward, never over his shoulder or in the crook of his arm. The two photos above illustrate the value of proper precautions on the part of both shooters. In the left-hand photo, the man in the lead has tripped and fallen and his shotgun, carried over his arm, is pointing directly at his companion. But the latter also was at fault in this situation. He was carrying his gun in the right hand with the muzzle pointing directly at the man in the lead, and thus both are being endangered by an accident which is quite common on the trail. The right-hand photo pictures what happens when the guns are carried in the correct position. The photo below points out another common and dangerous error in gun handling. Never hand a gun to your companion muzzle first. Any one of a number of things could happen to discharge the weapon while it is in the

Never hand a shotgun, or rifle, through the door or over car seat, muzzle first. Make sure gun is not loaded by opening action, or dropping barrels of a double gun, then hand it to your companion butt first





position shown. Always open the action, or drop the barrels if the gun is of the double-barrel type, to make sure that it is not loaded. Then, hand the gun to the man in the back seat, butt first. In this connection, keep in mind that it is unlawful in most states to transport rifles or shotguns in a car without taking the gun down, if it is of the take-down type, or slipping it into

Here's the way accidents happen when crossing a fence. One gun is pointing directly at man on the right

a carrying case, as you see the hunters doing in the photo above. Before placing the gun in the case, make sure that it is not loaded. The two photos below picture the right and wrong way for two hunters to cross a barbed-wire fence. In the left-hand photo the hazard is obvious, but in the procedure at the right neither man is endangering the other.

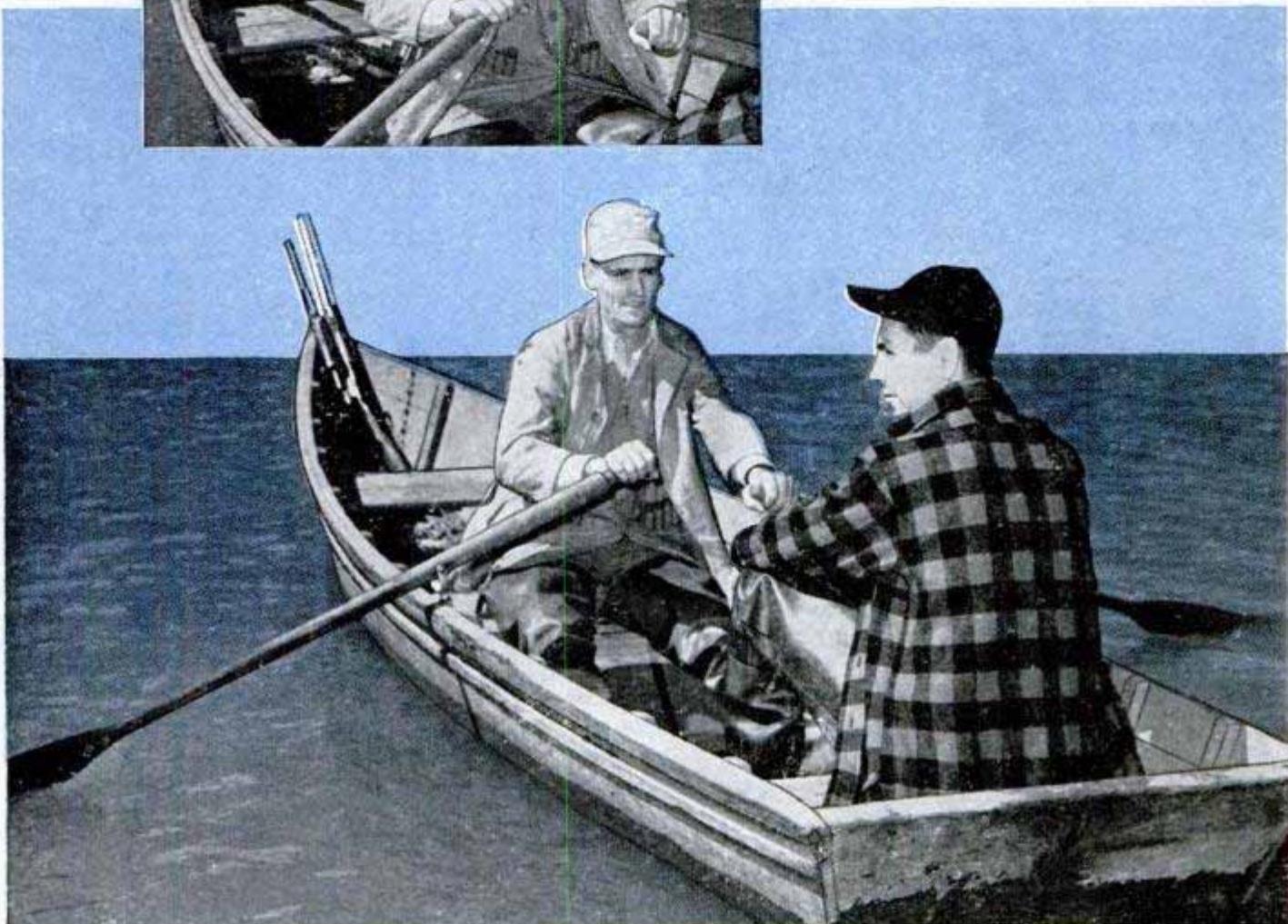
The safe way to do it. Note that action of pump gun is open and barrels of double gun have been dropped





Left, a duck hunter might get by with this for a long time, and then again, maybe not. Both guns in bow of boat are pointing at the back of the rower, a careless oversight

Below, this is better and safer, as both shot-guns are pointing at the sky and not at the man rowing the boat. Better practice is to leave both guns in cases until blind is reached



One of the hunters has fallen in soft mud and the other is pointing out spots on his clothing. But apparently neither has noticed real danger—the gun barrel has been plugged. Firing gun would burst barrel

Here plug of soft mud has been discovered and both shooters are aware of the danger. If you fall while hunting, make sure before firing gun that barrel is not plugged with mud or snow, or water which may freeze



INITIALED TUMBLERS



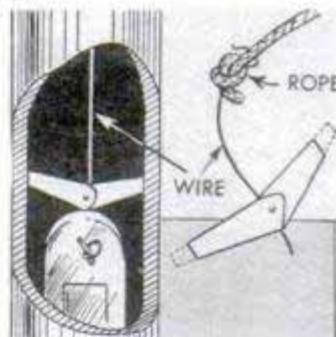
If the drinking glasses to be used at your next party have no means of identification, you can be sure that the guests won't pick up the wrong one by giving each guest a personalized glass marked with his own initials. This is done easily by hand-lettering the initials on the side of the tumbler with a china-marking pencil. Take care that all finger smudges have been cleaned from the glass before applying the pencil. After the party, remove the initials with soap and water.—Helen Lemberger, Chicago.

Pipe "Fished" From Bottom of Well With Bolt Toggle

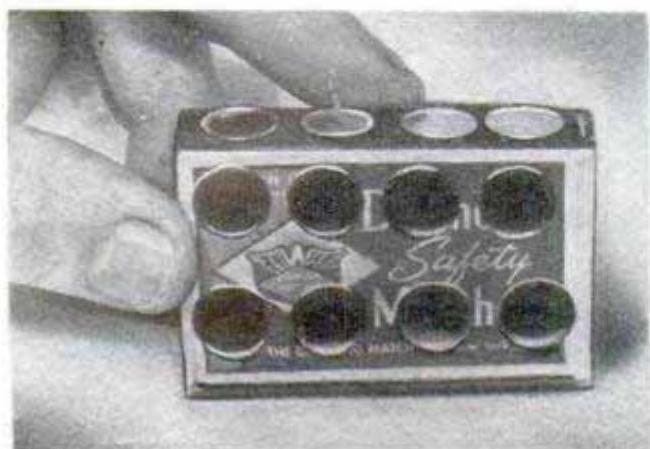
When vandals threw a number of boards and a length of 1½-in. pipe into the 40-ft. open well at our summer cottage, we were able to snag the boards with large fishhooks and pull them out of the well. However, the pipe presented a problem, as one end rested on the bottom of the well and the other end against the side so that the pipe not only was out of reach but impossible to snare with a noose. Nevertheless, we found a way to remove the pipe by means of a bolt toggle and a bar of solder. The toggle assembly was removed from the bolt and the wings were cut off, so that when extended they were just slightly longer than the inside diameter of the pipe. After slipping a short length of wire through the hole in the center of the toggle assembly, a bar of solder was tied to one end of the wire and

a rope to the other end. To raise the pipe, the bar and bolt toggle were lowered over the exposed end of the pipe and dropped into it, the weight of the solder carrying the toggle well within the pipe. Then the rope was hauled upward, pulling the solder against the toggle assembly and thus opening the toggle to wedge the ends of the wings tightly against the walls of the pipe. In this way, the pipe was hauled to the top of the well where it could be grasped and removed by hand.

Clarence J. Horton, Buffalo, N. Y.

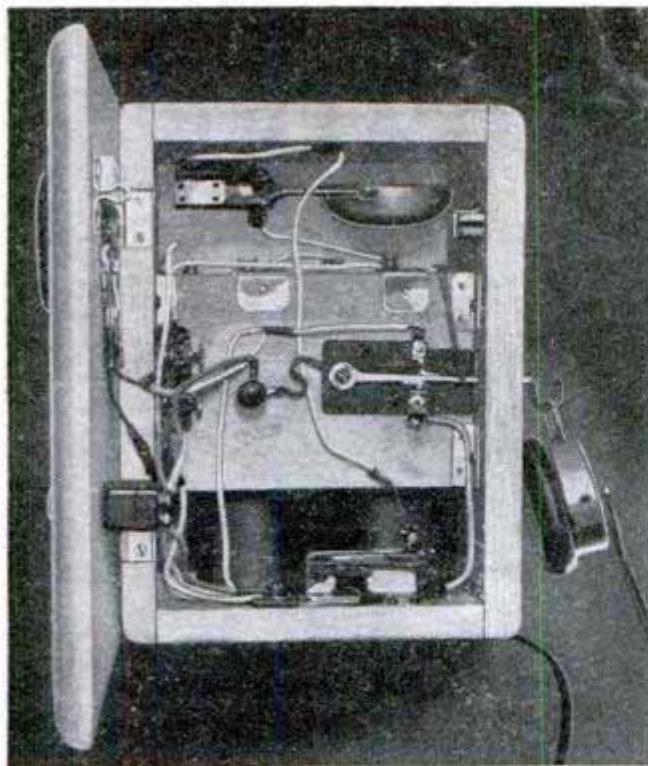


Matchbox Provides "Pincushion" for Storing Thumbtacks



Thumbtacks won't roll into the corners of a desk drawer or spill on the carpet where they are difficult to find, if they are pressed into an empty wooden matchbox. A dozen or more tacks can be stored conveniently by pressing them into the top, bottom and sides of the matchbox, and they are easily removed when needed.

To repair deeply scratched woodwork, fill the scratches with a filler mixture of fine sawdust and spar varnish. Then, after the filler has hardened thoroughly, simply smooth with fine sandpaper.

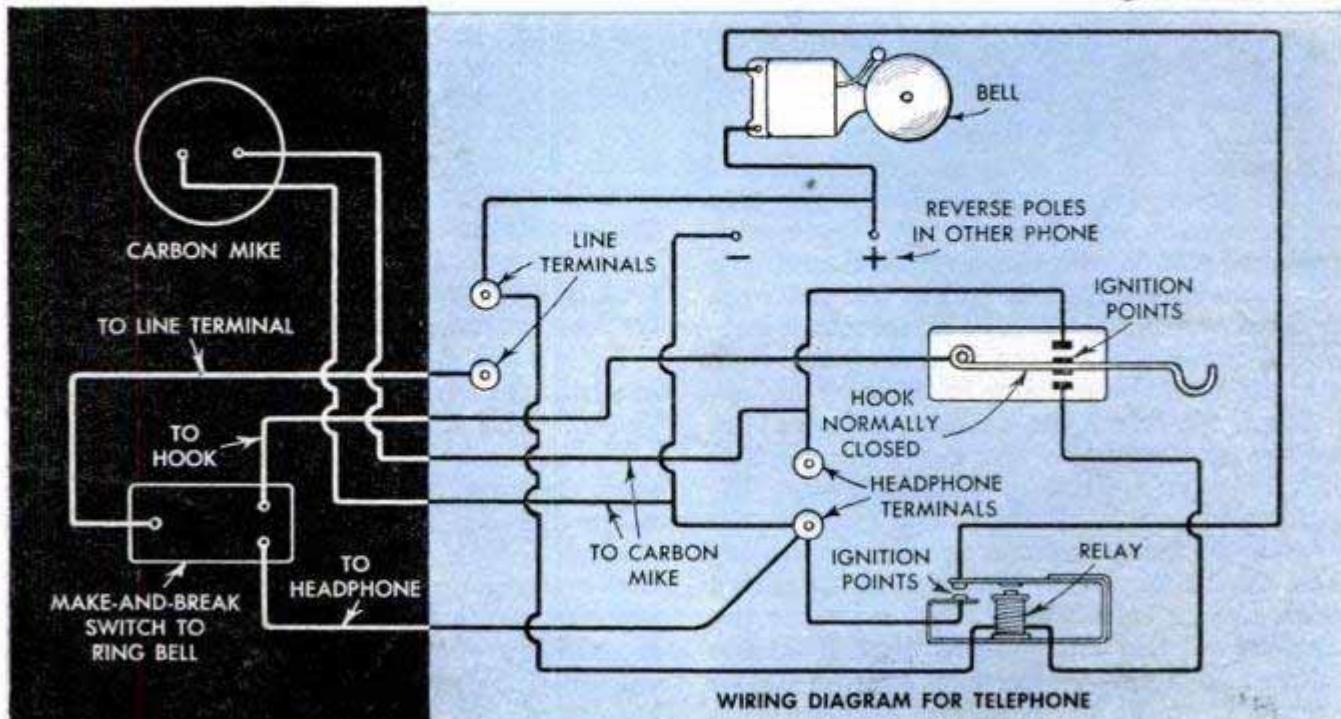
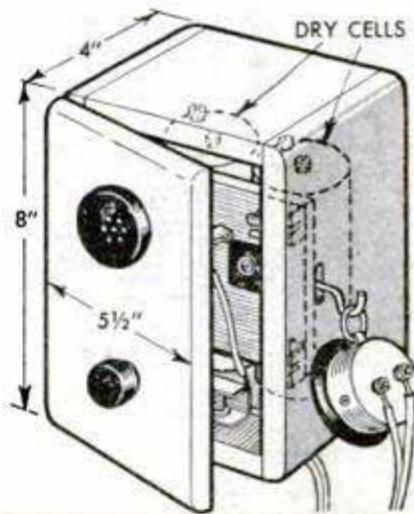


Make Your Own Private Telephone

By Anton and Mathew Carnevale

Photos by Eric M. Sanford

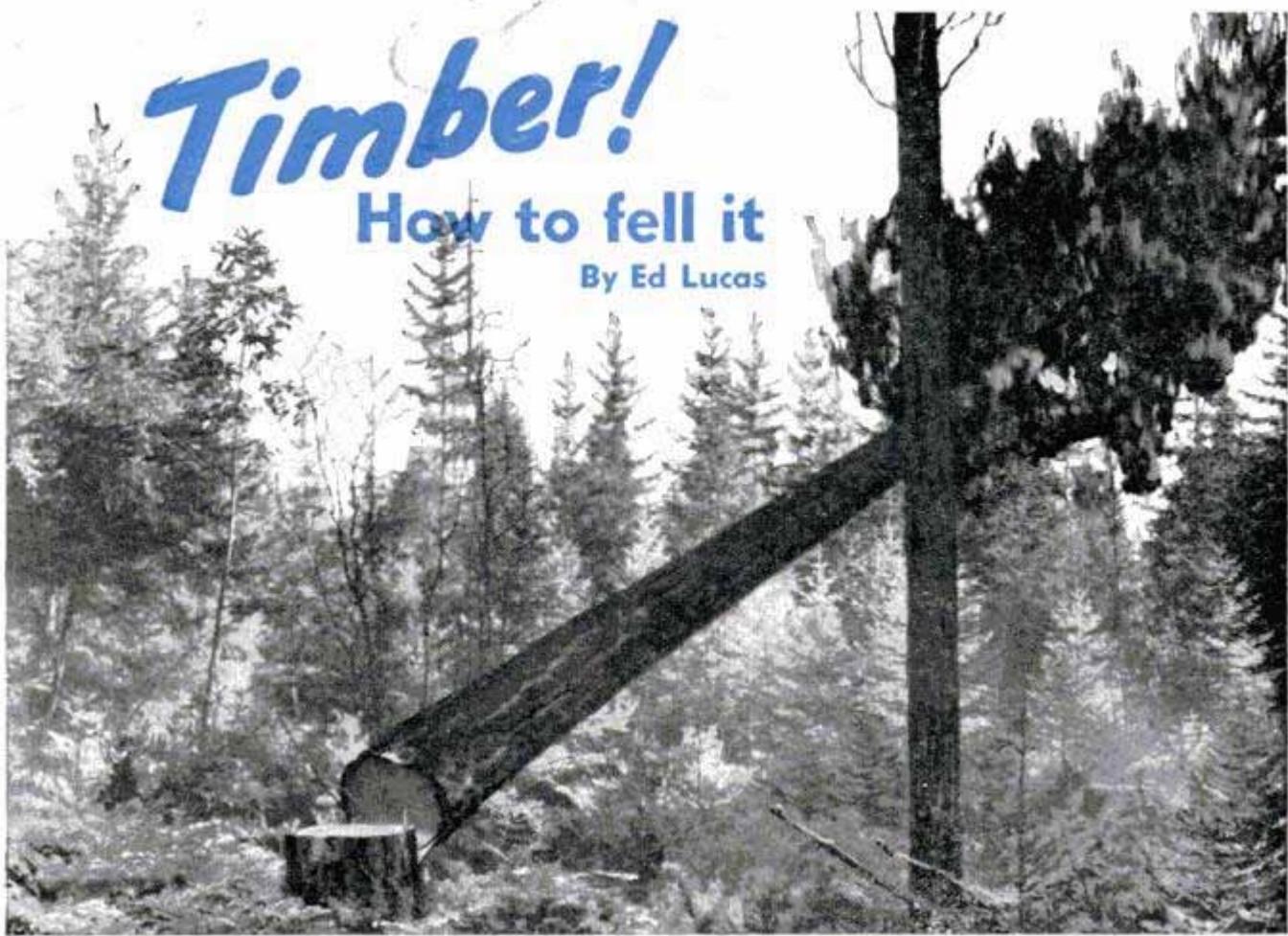
YOUNGSTERS will have a lot of fun with these midget phones when they are installed between floors in the home. They also have a practical application in larger suburban homes and on the farm. The individual phones are easily made as in the detail at the right which gives the over-all dimensions of the phone box. The diagram below shows how to wire the units. Radio headphones serve as receivers and carbon hand mikes as transmitters. Two No. 6 dry cells are connected in series in each phone unit. When the phones are more than 100 ft. apart, voltage drop in the line may make it necessary to install a relay to supply sufficient current to ring the bell or buzzer in the distant phone box.



Timber!

How to fell it

By Ed Lucas



GOOD TREE-FELLING practices eliminate waste, promote safety and conserve young growth for future cutting. While the basic mechanics of tree felling are quite simple, the technique must be adapted to the job at hand, whether this is a regular lumbering operation in a large forested area, selective cutting of individual trees in the farm wood lot, or the removal of a single defective tree from the suburban lawn or street curb. In big-woods logging operations, the problems of safety and conservation of young growth are first considerations when felling tall conifers and large hardwood trees that have grown to a great height. Often these are surrounded by smaller, underdeveloped trees that must not be damaged in felling the larger tree and removing the log and top. Here professional woodsmen use approved methods and modern equipment to get out the logs. In the farm wood lot where selective cutting is carried out from year to year, each tree marked for cutting is more of an individual problem in felling. Where the growth generally is more open, the tree usually can be dropped intact, and the trunk and top worked up into the desired lengths without interference from buildings, shrubbery, undergrowth or adjacent trees. Urban tree felling often involves the removal of the entire tree, including the stump and a part of the root system below ground, in small, easily handled pieces. This

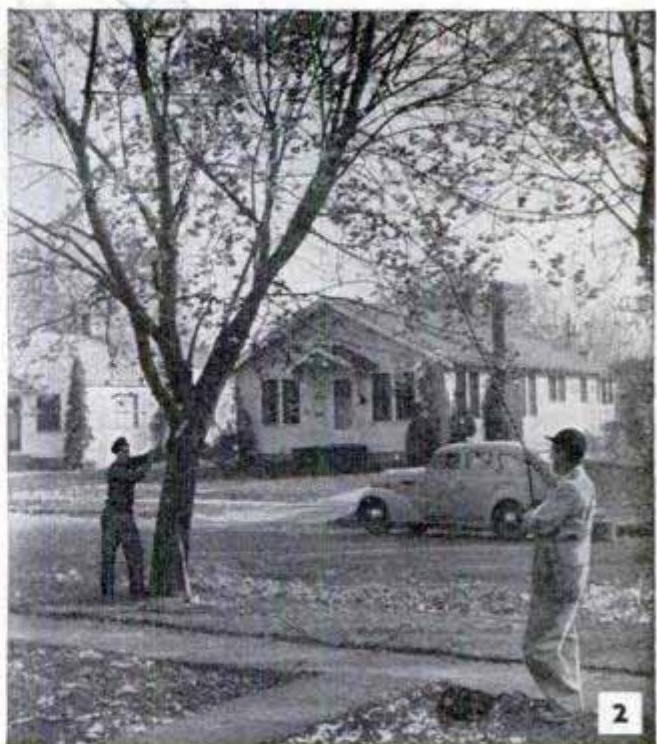
means that large limbs and the top one third of the trunk must be cut into short lengths and roped down to the ground from a considerable height.

Tools required for most jobs of tree felling are an ax, a two-man crosscut saw, two or three steel wedges and a light sledge hammer or a heavy wooden mallet. Where the work requires pruning and roping limbs down from the top of the tree, you'll need a pruning saw of the heavy pattern and a suitable length of $\frac{3}{4}$ -in. rope. Experienced woodsmen usually prefer a double-bitted ax in a medium weight with a straight handle, and tree surgeons and foresters quite generally use electric or gas-powered chain saws for felling and cutting up the tree. Electric and gas-powered chain saws are available in small sizes suitable for one-man operation. The electrically driven unit is light enough for use in the tree, as well as on the ground.

In felling, the first thing to do is walk around the tree to note the degree of "lean," and the general distribution of limbs in the top. A well-proportioned tree, with an equal distribution of limbs and not more than 2 deg. of lean can be dropped in almost any direction desired, providing this is done on a quiet day when there is little or no wind. If the tree is to be cut in a wood lot where there are other trees and valuable undergrowth near by, estimate the height of the tree so that you know ap-



1



2

In urban tree removal, where it is necessary to protect lawns, shrubbery and buildings, large limbs are removed from the tree before felling by swinging them into the clear and then lowering to ground with rope

proximately how far the top will reach in falling. It is well to remember that even the tiptop limbs of a large tree will damage small saplings and strip bark and twigs from standing trees, leaving open wounds which may become infected with various diseases. After you have decided which way the tree should fall, the next step is to make the undercut, Fig. 5. This is made with the ax on that side of the trunk which is in line with the direction you wish the tree to fall. Keep the bottom of the undercut flat and the top at an angle of approx-

imately 45 deg. However, the undercut need not be made square across as shown. It is easier to chop with the ax at a slight angle. The undercut should be finished out at a depth equal to about one eighth to one fourth of the diameter of the trunk and it is important that it be cut down uniformly to a vee all the way across its width. If it is only partially finished at one side or the other, the tree may tend to tilt in that direction when it starts to fall. On the other hand, if the vee is left high at the center, the tree may twist or spiral as it falls.

After undercutting and back cutting at the tree trunk, the limb is lowered without damaging the lawn or curb



3



4

Here's the way a large limb is cradled in a rope sling before being sawed through at the back cut

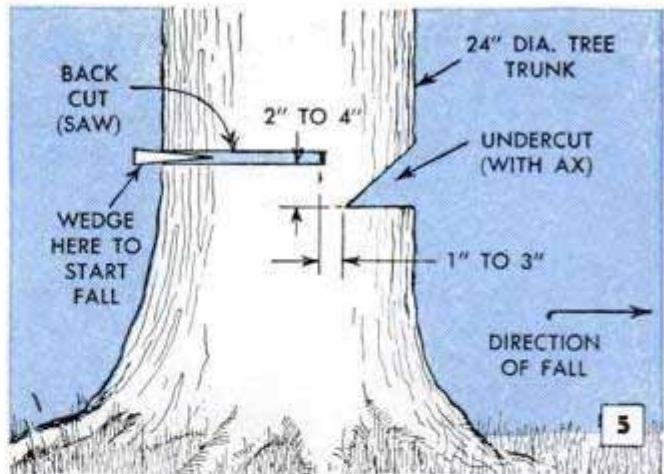


6

Above, a Turk's-head knot in end of the rope makes it easier to throw it over a high limb. Below, use a clove hitch when snubbing rope around a tree trunk



7



5

Control of the fall depends on how accurately and uniformly the undercut is made.

The back cut is made with the two-man crosscut saw and its height above the ground determines the height of the stump, therefore the undercut and back cut should be as low as is practicable in order to conserve as much as possible of the valuable trunk. On large trees, the back cut can be made to advantage with a chain saw, but on smaller trees the crosscut saw with a narrow blade is best as the narrow width of the blade permits starting the wedges, Fig. 5, before the cut is finished. This is of special advantage when it is necessary to fell a tree against the lean or laterally to it in either direction.

The critical point in felling is reached when the back cut has progressed to a point 1 to 3 in. back of the undercut. This leaves only a narrow cross section of the trunk still holding, Fig. 5. Woodsmen refer to this as the "hinge." At this stage a few light taps on the wedges generally will tilt the tree sufficiently to start the fall, after which the trunk will break at the hinge and the tree will fall free. By skillful use of the wedges woodsmen can make a leaning tree fall to the right or left of the direction of lean or in an opposite direction if the trunk is straight and the lean does not exceed 3 or 4 deg. They do this by making the back cut at an angle with the undercut, the former being cut deeper on the side toward which the tree is leaning. Two wedges are started as soon as the depth of the back cut will permit and they are driven in tightly as the cut progresses. This procedure leaves wood holding on the side opposite the direction of lean and tends to tip the tree in a lateral direction, or, in some cases, "over backwards." Usually the trunk must be broken at the hinge by wedging tightly. It's always best to remove the saw before wedging the tree over. In Fig. 11, the spots marked X generally are considered the safest places to stand while the tree falls. Never stand directly back of a falling tree. Keep a sharp watch for

falling limbs and look out for flying splinters and twigs, especially as the tree strikes the ground.

Urban tree removal may or may not involve an ordinary felling problem. Usually on a small lot, the top of the tree overhangs the house or shrubbery and the overhanging limbs will have to be removed by swinging into the clear, or lowered piece by piece to the ground. The process of swinging a large limb and lowering it is pictured in Figs. 1, 2 and 3. First, the rope end is thrown over a near-by limb and the end tied to the one that is to be removed. One man keeps tension on the rope, Fig. 2, while the other saws off the limb as in Fig. 1. Note that an undercut is made on the side of the limb toward which it is to swing and then the back cut is made in the same manner as in felling a tree. When the back cut is nearly through, the limb will swing and finally break, Fig. 4, after which it can be lowered safely to the ground, Fig. 3. By roping in this way it is possible to swing large limbs sidewise so that they can be lowered safely to the ground without damaging shrubbery or any part of the house or garage. One thing to keep in mind when lowering large tree limbs is that the limb will fall butt first if it is allowed to fall free. Tree surgeons often remove large limbs by fixing a tackle block near the top of the tree. They attach the lower end of the tackle to the limb a short distance beyond its center of gravity, then make the undercut on the top of the limb and the back cut from the bottom. A helper on the ground keeps tension on the tackle until the limb is sawed off completely. The limb will swing in toward the tree trunk with the butt down and from this position it is easily lowered to the ground. Where the tree cannot be dropped intact without damaging buildings, lawn or shrubbery, it usually is possible to remove all large limbs by these methods and then fell the trunk without damage. Where the local ordinances call for removal of the stump, cut the trunk 3 to 5 ft. above ground, Fig. 10, and dig away the earth around the stump so that the large brace roots can be cut off as in Figs. 12 and 13. After these roots have been cut, it is comparatively easy



8

It's a good idea to make a platform of limbs to protect the lawn from being damaged by the falling tree

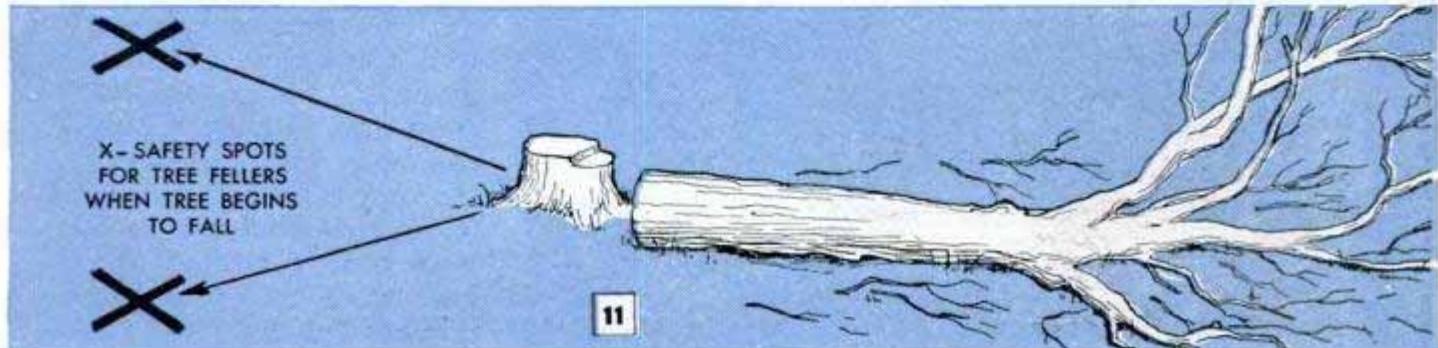


9

Above, trimming limbs from one side of a tree often is an aid in felling. Below, if the stump is to be removed, make the back and under cuts 3 to 5 ft. high



10





12

Above, when limbs have been cut off, trunk is easily removed by cutting off brace roots as shown below



13

After cutting the brace roots, pull out the trunk with a truck or automobile



14

to remove the stump with a car or small truck as in Fig. 14.

Very often in urban tree removal it is possible to cause a tree to fall just where you want it simply by removing all, or a part, of the large limbs on the side opposite to the direction you want the tree to fall. Fig. 9 shows how this works on a low, spreading tree. The weight of the limbs on one side serves to pull the tree over without wedging or the use of a tackle block. Often it is necessary to protect the lawn or curb from damage by the falling tree and this can be done by making a platform of the limbs and twigs as in Figs. 8, 9 and 10 to break the fall of the trunk and prevent it from gouging into the lawn.

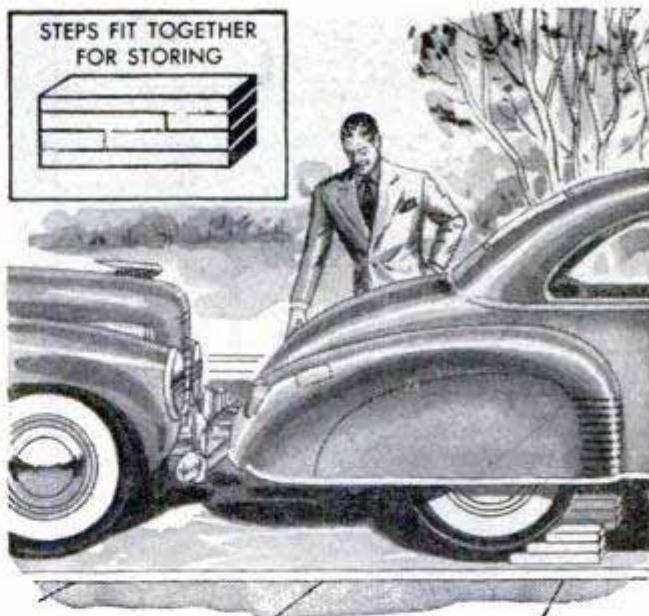
As a rule, the best time to take down a tree by the methods just described is in the late fall or winter after the leaves have fallen and the sap has gone down. The lowered moisture content lightens the wood considerably, and it works easier with axes and saws. Be especially careful when taking down a dead tree or one that has been weakened by disease. Limbs that look sound may break easily; the trunk may be rotted away at the center and may break off without warning before you finish the back cut, permitting the tree to fall out of control. Don't attempt to fell or remove a tree whose limbs overhang or interlace with a power line or telephone wire. Call the local power company or the telephone company. They will have special equipment for handling such a job. Many larger towns and cities have ordinances forbidding the cutting or pruning of trees on the street curbs without special permission from the street department. Don't work in a tree when the bark is wet from rain, or when the limbs are covered with snow, or

when the wind is blowing. If you have to carry tools into the tree provide them with rope slings so that you always have both hands free when climbing. Take precautions against dropping tools. A rope is easily thrown over a high limb if you tie a Turk's-head knot in the end as in Fig. 6. When anchoring the rope end to another tree, use a clove hitch as in Fig. 7, rather than a conventional knot, which cannot be untied easily if the rope is under tension. Make sure that the rope is in good condition and keep the ends knotted to prevent fraying.

Steps Fit Under Car Wheels To Release Locked Bumpers

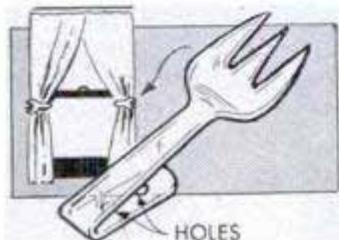
No effort is needed to disengage locked bumpers if the top bumper is raised by driving the car up these miniature steps. The steps are merely sections of 2 x 4 cut to three different lengths and spiked together. The pair of steps fits together compactly for storing in a car trunk.

J. Shields, Bloomington, Ill.



Tiebacks for Kitchen Curtains Bent From Plastic Forks

Novel and appropriate tiebacks for full-length kitchen curtains are made easily and at a cost of only a few cents by bending them from plastic forks or spoons. Using long-handled forks, drill two screw holes near the ends of the handles. Heat the plastic at a point slightly below the screw holes and bend the handle double. Mark the long arm of the tieback directly opposite the screw holes, and then drill aligning holes through this arm, inserting a small wooden spacer between the two arms to prevent breaking the plastic. The holes in the long arm should be large enough to allow the heads of the screws and the screwdriver blade to pass through them. Another way of attaching the tiebacks, which eliminates holes in the exposed part of the handles, is to form two vertical keyhole slots in the short end of each one before bending and simply hook the tiebacks over roundheaded screws.

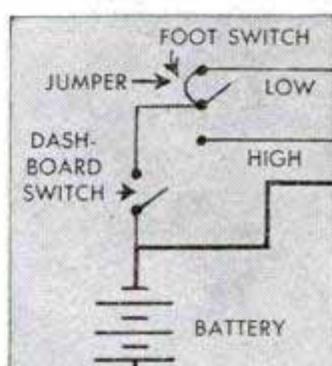


W. Dyre Doughty, Evansville, Ind.

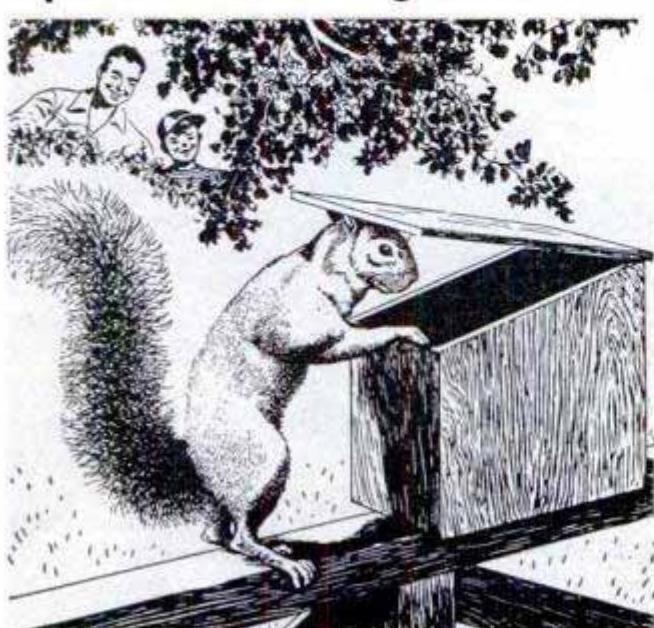
Increasing Power of Auto Headlights

Wanting more light than usual from the high beams of my sealed-beam headlights, I found a way in which this could be obtained easily. I simply connected a jumper from the battery terminal of the foot switch to the low-beam terminal of the dashboard switch. With the jumper in place, the low beam turns on with the dash switch and remains on until the switch is turned off. Thus, when the high beams are turned on with the hi-lo foot switch, the low beams remain on, adding their strength to the light that is thrown by the high beams.

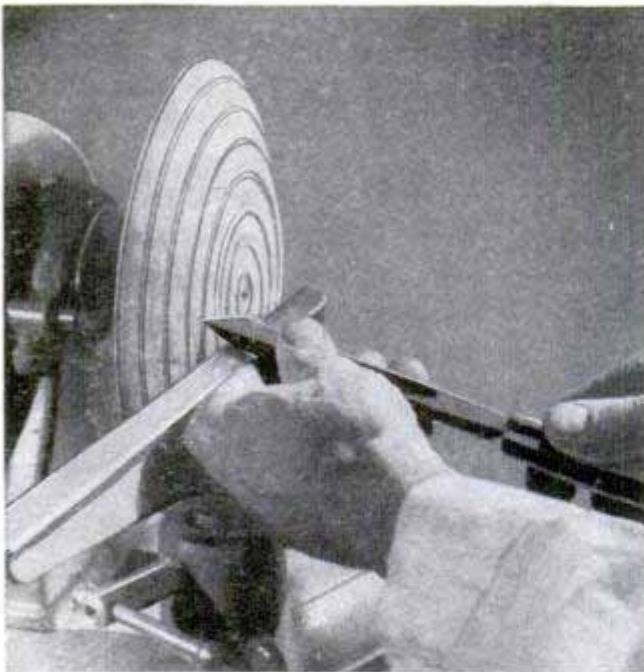
J. H. McDuff, Peoria, Ill.



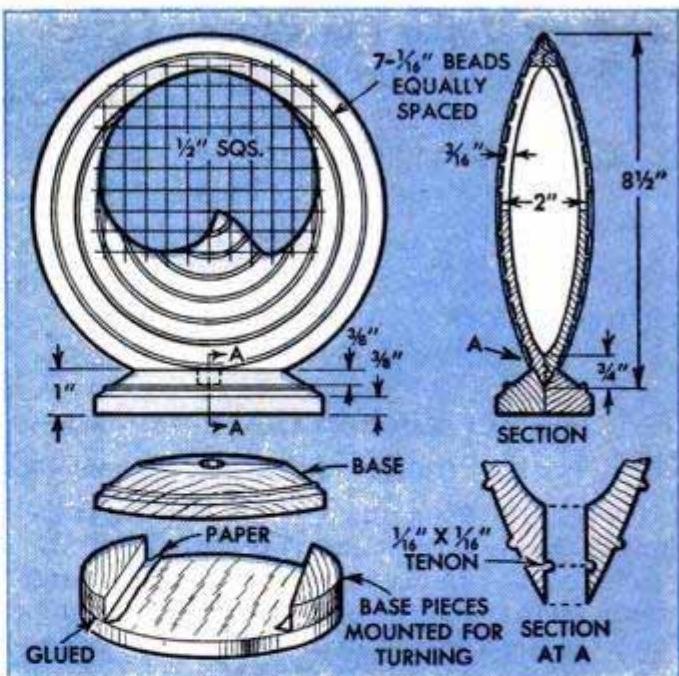
Squirrels Amuse Neighborhood Children by Feeding at "Automat"



Besides keeping food dry and protecting it from other rodents, the hinged lid of this squirrel feeding box affords hours of entertainment in watching the squirrels gain access to the food. It is easy to teach most squirrels to open the lid, as it overhangs the front of the box, and the squirrels nudge it upward and slip their heads inside. To train the squirrels, fill the box with shelled or unshelled peanuts, prop the lid open about 1 in. and scatter peanuts on the ground beneath the box. After a few days, when the squirrels have discovered the new source of food, keep the lid propped open only about $\frac{1}{2}$ in. A day or two later prop the lid about $\frac{1}{4}$ in. open. By this time the squirrels will have learned to push the lid upward with their noses and the prop can be removed.



Above, one face of each disk is turned convex and then seven small beads are cut in the surface with a parting tool, spacing them an equal distance apart



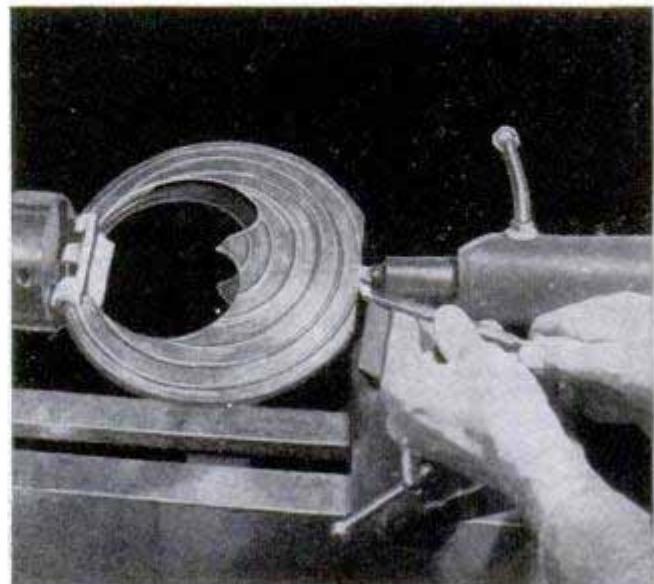
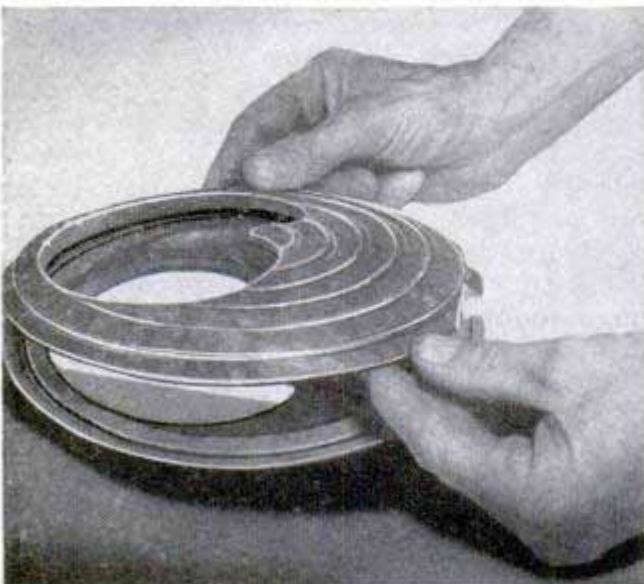
Below, when the turnings are completed, an irregular cutout is made in each with the jigsaw to carry out basketlike design. Sawed edges are sanded smooth



Below, the two disks are fitted together after jigsawing and the joint is glued. Note that a small projection has been jigsawed at the bottom of each disk



Below, after the disks are glued together, the projections on the bottom edge are turned to provide a tenon and the jigsawed flat is trued at the same time

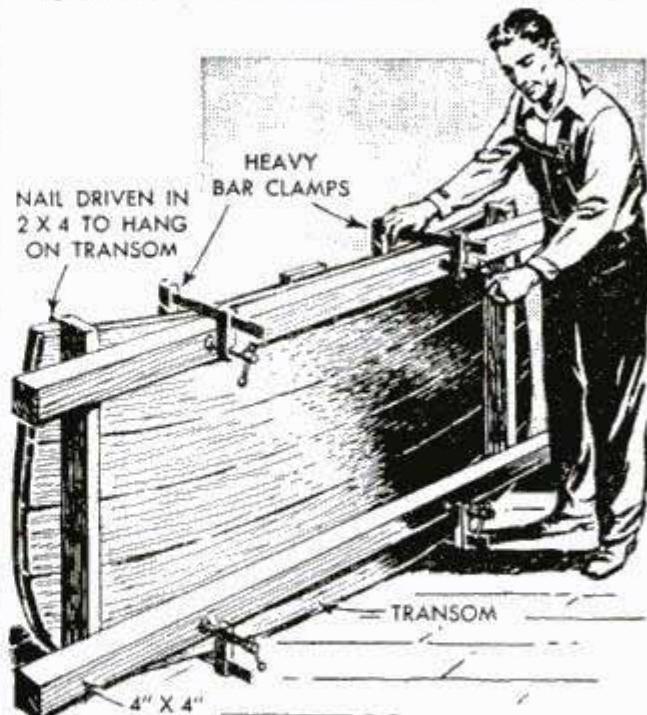


NOVEL PLANTER *Turned on the Lathe*

By Benj. Nielsen

HANGING from a wall bracket or used as a centerpiece, this unusual planter adds an attractive, decorative touch to any room. It's made almost entirely on the wood lathe and, while the original was made of walnut, you can use any good turning stock, such as maple, birch, myrtle or poplar. The first step is to mount two disks successively on the faceplate and turn one face of each convex to a uniform radius. Then form seven $\frac{1}{16}$ -in. beads equally spaced on the convex face of each disk as in the upper left-hand photo on the opposite page. Sand the surface smooth before removing the work from the lathe and center-mark each disk by running-in with a corner of the square-nosed tool. Remove the work from the faceplate and drill a small hole through each disk at the center mark. Now, reverse the disk and attach it to a screw chuck with the flat side of the work facing out for dishing. Note in section A that after recessing, a round-bottom groove is cut in the inner rim of one disk and a matching tenon is relieved on the rim of the other. Recess the disk first, face off the rim lightly to true it and then cut in the groove. Recess the other disk and measure carefully to locate the tenon properly, so it will fit snugly into the groove. Then remove the work from the screw chuck, mark the outline of the cut-out on each disk from the squared detail and cut away the waste pieces with the jigsaw. Also, saw a flat and projection at the bottom of each disk. Next, glue the disks together and, when the glue is dry, chuck the work as in the lower right-hand photo so that the projection on the bottom can be formed into a tenon for mounting the base. To make the base, glue two semicircular pieces to a wooden disk with a sheet of paper in each glue joint so that you can easily remove the pieces from the disk after turning. Bevel the curved corners and then relieve to form a $\frac{1}{16}$ -in. bead. Remove the base pieces from the disk, glue them together and drill a hole at the center to take the projecting tenon which was turned on the bottom of the planter. Glue the base in place, making sure it is positioned correctly. Finish in the natural color of the wood with shellac and wax, or in colored enamel. If desired, you can fit a semicircular copper liner with a soldered joint inside the disks. In this way the planter can be used for growing ivy or other trailing plants.

Dry-Bending Large Boat Transom



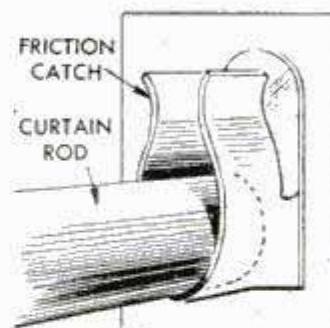
Curving the transom of a boat can be quickly and easily accomplished with this simple fixture made from two horizontal 4 x 4s and two vertical 2 x 4s. The fixture is positioned after the transom has been built up on its frame and bolted in place to the horn timber. Heavy bar clamps are used to curve the transom, these being taken up slowly and evenly, with the 4 x 4s placed horizontally under the clamps on the outside. If the fixture is left on the transom until the boat is planked, nearly all of the curvature will remain. As much as 6 in. of camber in a 7-ft. transom can be obtained by replacing the vertical 2 x 4s with 2 x 6s.

Harry U. Snow, Kennebunkport, Me.

Friction Catch Holds Curtain Rod

When draperies or curtains are to be hung on a rod supported between the inner faces of window or door casings, use the U-shaped part of a friction catch to hold each end of a length of curtain rod. The catches will handle rod up to $3\frac{1}{8}$ -in. in diameter, and curtains are easy to take down as the rod is simply lifted out of the holders.

Victor H. Lamoy, Upper Jay, N. Y.

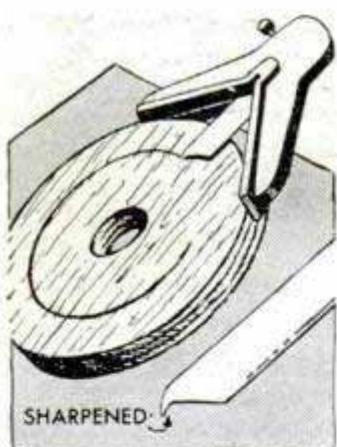


Prolonged use of the car starter pumps raw gas through the motor, thinning out lubricating oils and increasing wear on piston rings and cylinder walls.



Concentric Circles Scribed on Disk

When painting toy wheels or wooden disks, it is difficult to use a compass to scribe concentric circles on the face if a hole for a screw or axle has been drilled through the center of the disk. However, the circles can be scribed easily by using the center head of a combination square together with a piece of broken blade or flat steel that will fit in the center head. After cutting off one end of the blade at an angle, bend down the tip, sharpen and harden it for the point of the scribe. Lock the blade in the center head by means of the set-screw and use the tool as illustrated.



Small Parts Stored Compactly in Plastic Ice-Cube Trays

Each size and type of bolt, screw or washer may be kept in an individual compartment by using plastic ice-cube trays to store the small parts. The compartments are deep enough to prevent accidental spilling or mixing of the contents, and the trays are made to facilitate stacking them one on top of the other for compact storage. Appropriate labels can be fastened to the sides or ends of the trays to speed finding a particular part.

Jack Wilson, San Pedro, Calif.

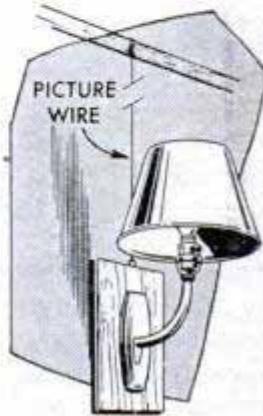
Holder for Several Artist's Brushes Fits Edge of Drawing Board

Mounting a new stiff-bristle scrub brush on the edge of the drawing board provides a convenient holder for artist's water-color, retouch and lettering brushes. The scrub brush holds the artist's brushes within easy reach, allowing them to be stored in a bristles-down position which is recommended for maximum service.

Lamp Hung From Picture Molding Is Convenient to Move

A pin-up lamp becomes a versatile lighting fixture when it is hung from the picture molding. In this way, it can be moved quickly to be used as a bed lamp or reading lamp and its location changed in a few minutes to illuminate a card table or other spot where extra light is needed. Just mount the lamp on a finished wooden backboard and drive a screw eye into the top edge of the board to permit fastening a length of picture wire and a hook.

Pat Fey, New York City.



Touching Up Worn Rug With Textile Paint

Those areas of a rug that wear out faster than the other portions as a result of extra-heavy traffic can be touched up with textile paint. Match the paint with the rug color by experimenting on a small spot and then paint the worn area of the rug, following the outline of the design. Even though the worn fibers are not restored, the touching up will blend the worn area with the rest of the rug to improve the appearance.

N. Campbell, Boston, Mass.



CORNER CUPBOARDS

With Scrolled Shelves

By Major S. K. Gaskyn, U. S. Army, Ret.

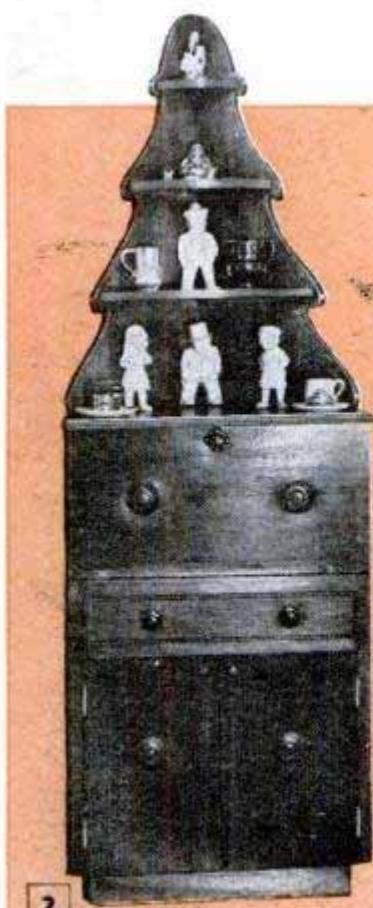
SPACE-THRIFTY homemakers will find either of these corner cupboards an attractive addition to the room furnishings as well as a useful occasional piece for the den or recreation room. Both cupboards provide drawer and shelf space in the lower compartment, and open shelf space above. The combination cupboard and secretary has the convenience of compartments for personal papers and stationery, and a fold-down writing shelf, Fig. 8.

Both cupboards shown in Figs. 1 and 2 are built by first laying out full-size patterns for the framework on heavy wrapping paper so that dimensions can be taken directly from the layout as the work progresses. Mahogany was used for all exposed members of the originals, but maple or birch also is suitable. Rails for attaching the top to the frame are made up and screw-fastened, without glue, to allow for expansion. Dimensions of the base for each cabinet allow for a 2-in. recess across the front and ends, see Figs. 7, 10 and 11. In the back the base fits flush with the back panels.

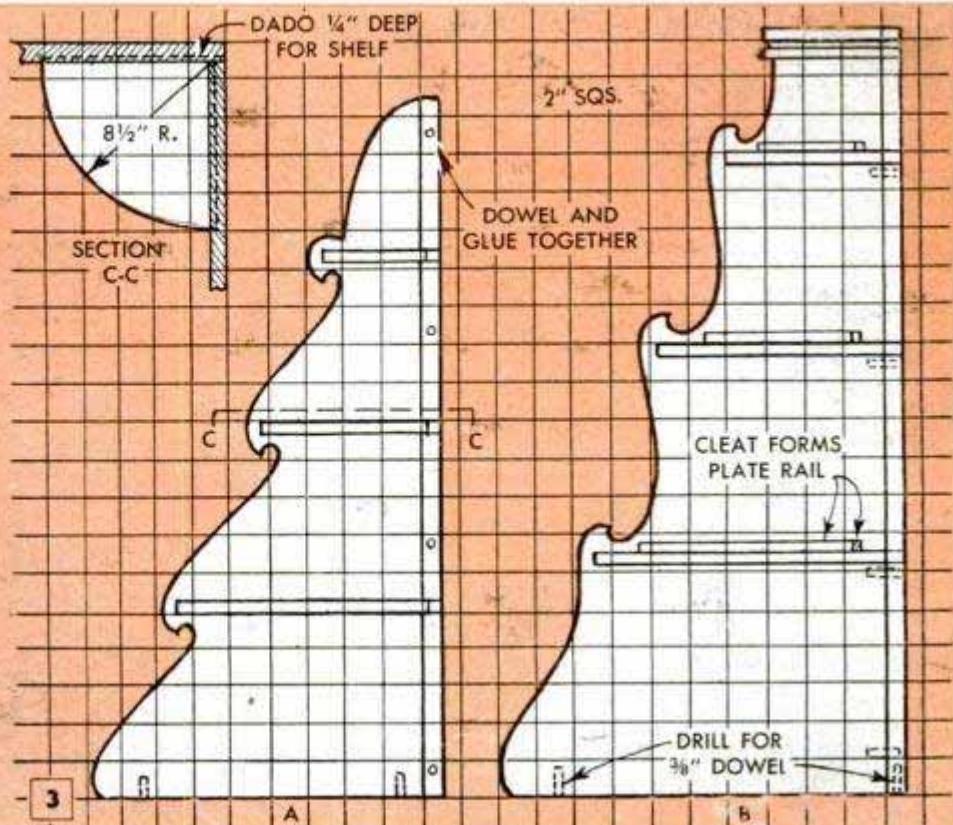
The secretary compartment is made up as a separate unit, Fig. 6, and installed as one piece. The cut-out facing of the unit is made up of two pieces of $\frac{3}{8}$ -in. plywood, an opening being cut in the lower piece for a small drawer. A plywood base to support the upper part of the unit is glued flush to the inside



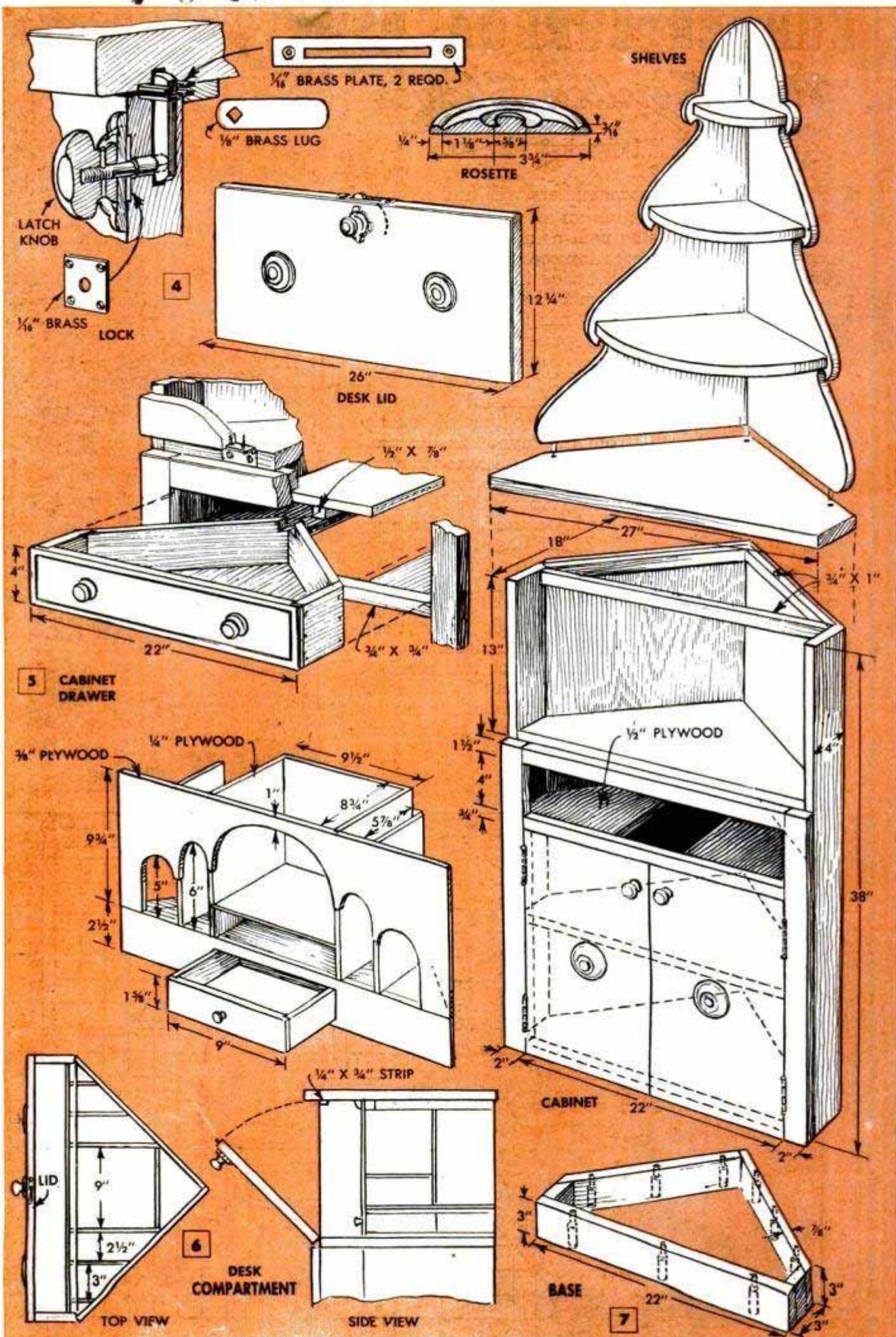
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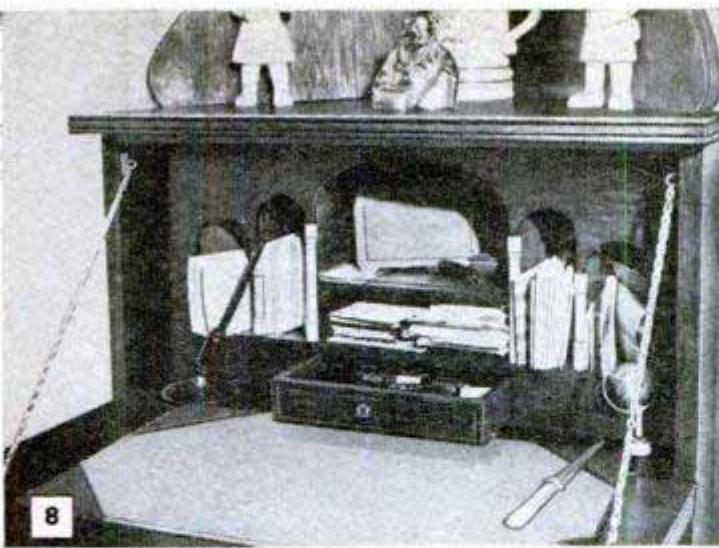


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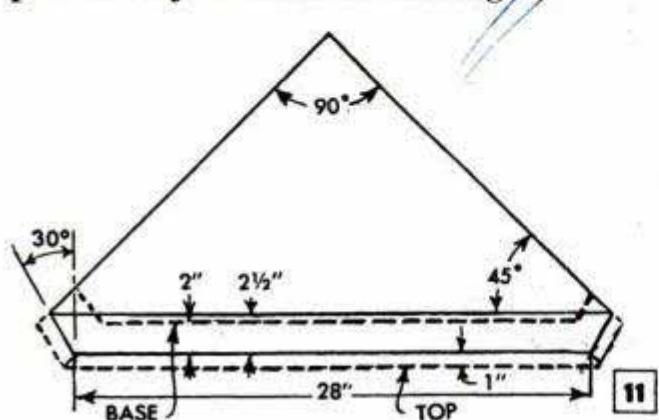


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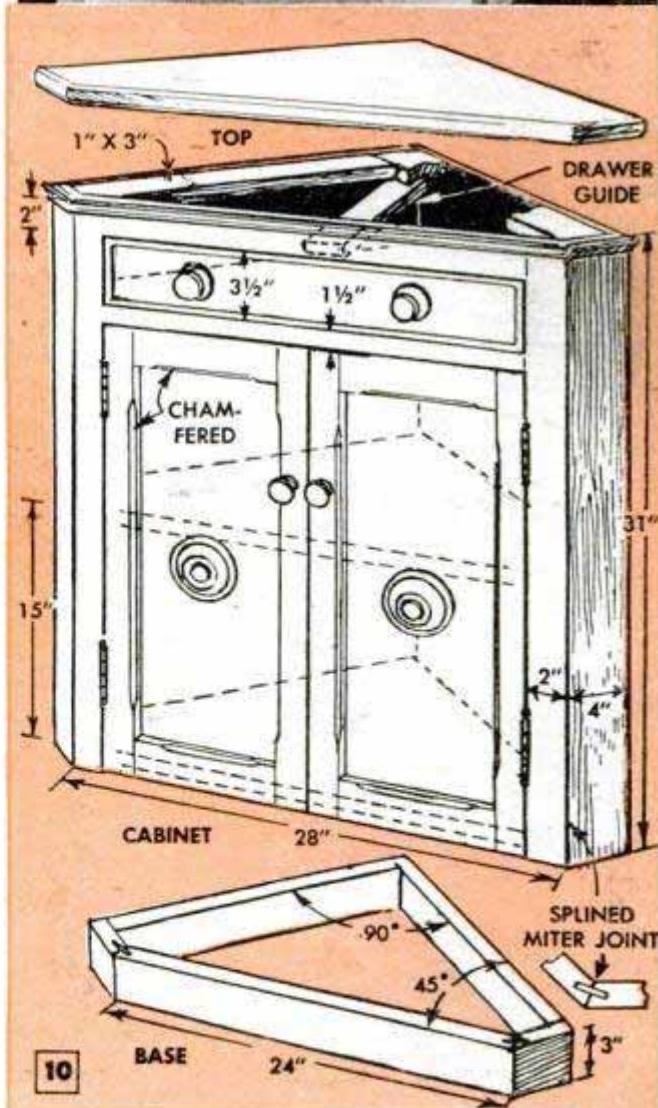
top edge of the lower facepiece and glue-blocked along the inside. Then pieces fitted at right angles to the drawer opening are installed to form a compartment for the drawer. Small cleats fitted along the inside of the compartment on each side support the drawer in a level position. After the top section of the unit is assembled and joined to the bottom one, the assembly is slipped in place in the cabinet and held at the top with a small molding. For the large drawer, shown in Fig. 5, an upper guide rail must be installed. This is made to the dimensions given in the drawings and a slot is cut in the back corner of the drawer to accommodate the guide rail.

A standard commercial lock can be used to hold the writing shelf closed, or a special locking device can be made as in Fig. 4. The homemade lock with its ornamental knob is more attractive. The detail shows how these parts are made and assembled.

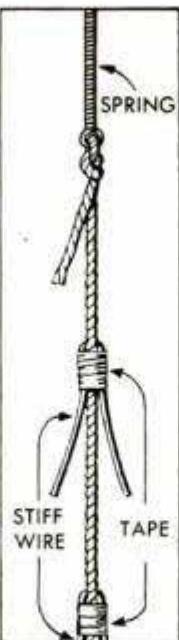
The upper sections of the cupboards, with their scrolled shelf assemblies, are made by first drawing the outlines full size, Fig. 3, on heavy paper and tracing directly onto the wood, which is then sawed accurately to shape on the bandsaw. The shelf edges fit into blind dadoes cut in the sidepieces and are glued permanently in place. The completed assembly is mounted on the cupboard top, Fig. 9, by three dowels which hold the unit in place without gluing and permit easy removal for moving.



9

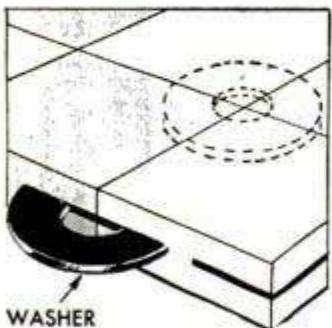


Clothes Freed From Laundry Chute With Claw-Fitted Rope



Clearing a laundry chute clogged with clothing is a washday irritation that is no longer a problem if the chute is fitted with a series of wire claws to free the clothes. A rope, which runs the length of the chute, is tied to a screen-door spring and the spring, in turn, is fastened to the top of the chute. The claws are moved up and down to free the clothes simply by pulling on the end of the rope. A length of clothesline will do for the rope and the claws may be bent from coat-hanger wire. To prevent the possibility of tearing the clothing, the sharp ends of the claws should be bent upward or formed in an eye. The latter are attached to the rope at 12-in. intervals by passing the wire through a hole punched in the rope and then wrapping it with tape as shown in the detail. The rope may be hung in the center of the clothes chute or at one side with equal effectiveness.

Washers Join Wooden Squares To Reinforce Checkerboard



An attractive checkerboard having an inlaid effect, but usable on either side, can be made by gluing together squares of contrasting woods, reinforcing them with metal washers. This eliminates the need for a backing and allows both sides of the squares to be exposed. Slots are cut in the corners of the squares to receive the washers which are inserted during assembly. In addition to reinforcing

nates the need for a backing and allows both sides of the squares to be exposed. Slots are cut in the corners of the squares to receive the washers which are inserted during assembly. In addition to reinforcing

the checkerboard, the washers keep the squares from shifting while the glue sets. It is important that the saw slots be the same thickness as the washers and that the latter fit snugly into the pocket formed by the slots in the four adjoining pieces. This is done by making the depth of the slot equal to the radius of the washer.

James Bebermeyer, Columbia, Mo.

Clipboard Set Against Lamp Is Helpful in Typing

When a considerable amount of copy or lengthy notes are to be typewritten, the work is easier to follow if the sheets are fastened to a clipboard which is set upright against a gooseneck lamp. A small C-clamp is fastened to the gooseneck at the base of the socket and the board is hooked over the handle of the clamp. Thus, the lamp illuminates the copy while holding it in a position for easy reading.



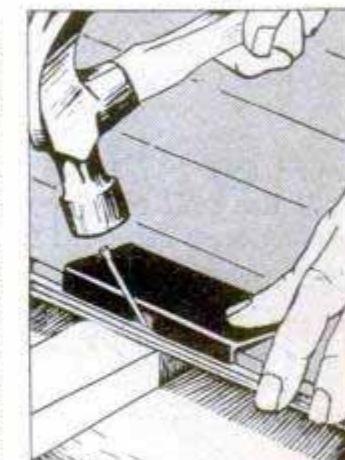
Fish-Bowl Water Supplies Fertilizer

Next time you change the water in the goldfish bowl, don't throw it away. Instead, use it to water the house plants, as the fish-bowl water contains fertilizer which forms a valuable plant food.

Harry H. McIntyre, Midland, Mich.

Metal Shield Protects Flooring

Tongue-and-groove flooring is protected from hammer blows if this angle-iron shield is used while nailing. One side of a 4 or 5-in. length of angle iron is cut off to a width equal to the distance from the face of the flooring to the tongue. The center of the short side is then notched for the nail. In use, the shield is placed over the edge of the flooring board with the notched edge resting on the tongue. Then the nail is driven through the notch.

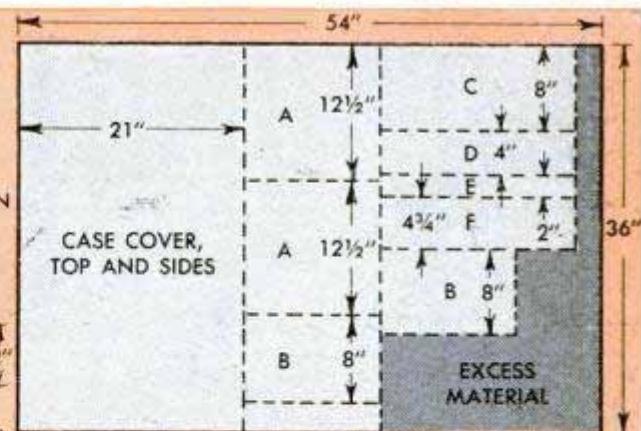
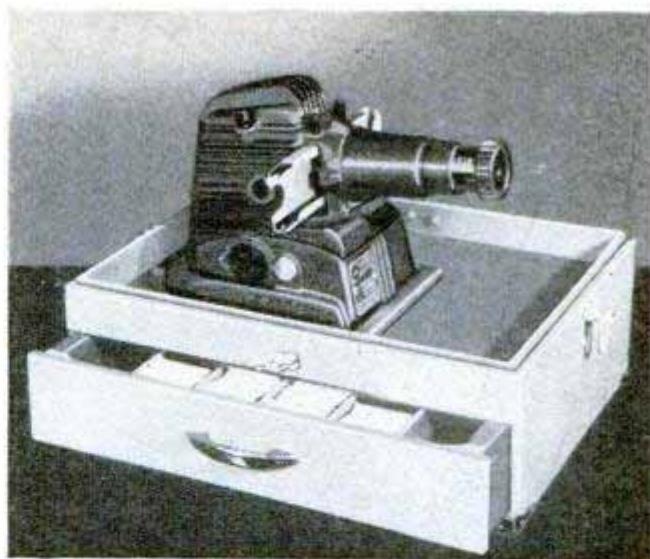
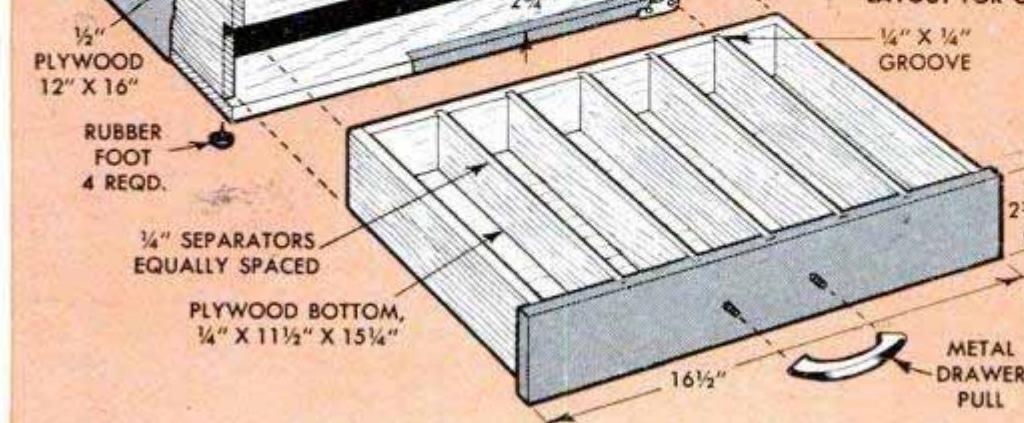
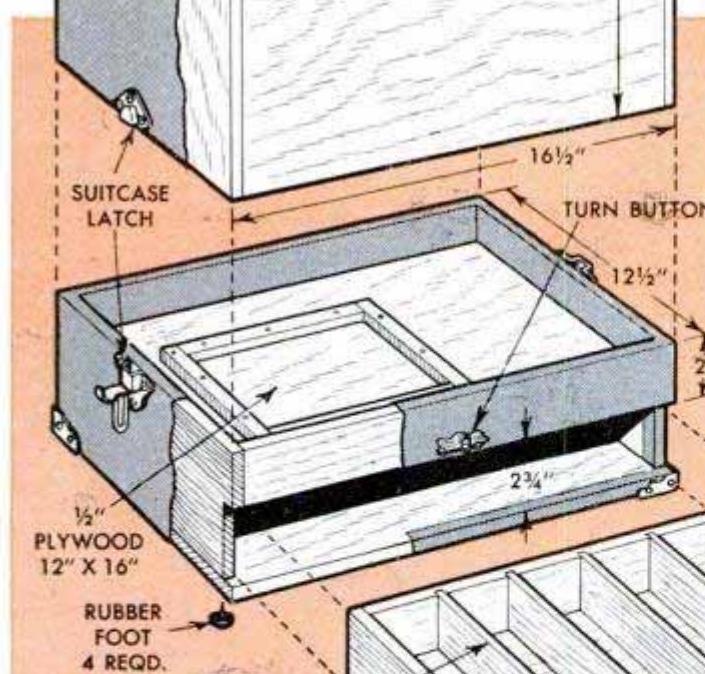
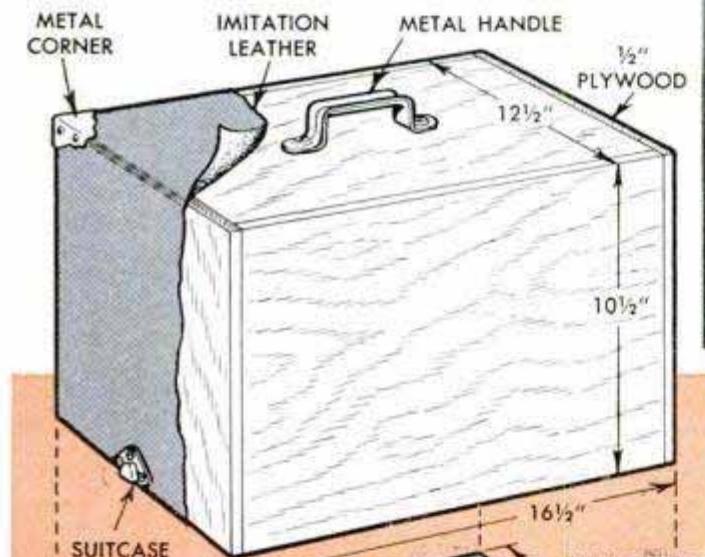


Benj. Nielsen, Aurora, Neb.

SLIDE-PROJECTOR CASE

By Whitney K. Towers

THERE'S storage space for the projector and cord, and an album of more than 1000 slides in this neat, sturdy carrying case. Lift off the top, plug in the power cord, pull out the slide drawer and you're ready to show your pictures. Nearly all parts of the base, drawer and cover are made from plywood and covered with imitation leather. Corners are butt-joined with screws and glue to simplify construction. Note that the endpieces of the base are notched so that the slide drawer will close flush. The $\frac{1}{4}$ -in. separators in the slide drawer are fitted into $\frac{1}{4}$ -in. grooves cut in the front and back pieces. After covering the case with imitation leather, which is cut from a single piece as shown in the right-hand detail below, attach metal handles, suitcase latches, turn button and metal corners to finish the job. Rubber feet are optional.



LAYOUT FOR CUTTING COVERING

1/4" X 1/4" GROOVE

A—CASE COVER (END)
B—BASE UNIT (END)
C—BASE UNIT (BACK)
D—BASE UNIT (FRONT)
E—BASE UNIT
LOWER EDGE (FRONT)
F—DRAWER FRONT

NOTE—DIMENSIONS MAY
HAVE TO BE ALTERED TO
SUIT DIFFERENT TYPES
OF PROJECTORS

RELIEF FROM

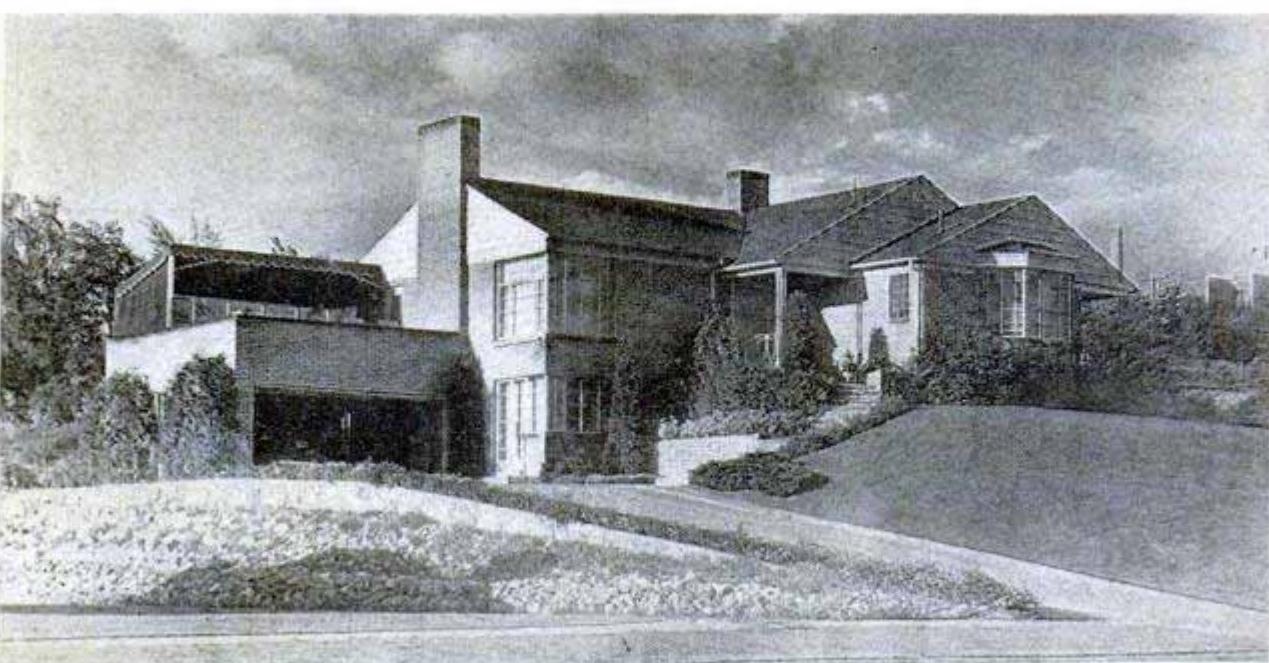


Cut-Glass Technique

MOST home-darkroom fans are content with making ordinary straight prints from their negatives but, for those who seek relief from the conventional, there are several simple processing techniques which can be used to produce very unusual and artistic photographic prints. Four of the seven techniques described in this article are graphically pictured in the series of prints of the model which shows what can be done with the same negative.

Cut-glass technique: Here, as you may have guessed, the example above was made

Bas-Relief



As if looking through a veil—here's a good example of what can be done to convert an ordinary shot into a print of unusual quality. It's done by printing through a piece of cut or figured glass



Reticulation

Highly artistic effect shown above is gained by printing negative through reticulated matte. Below is fine example of how plain print of a home can be made to look like a bas-relief type of etching. This is done by printing a positive and negative, placed off register

THE USUAL

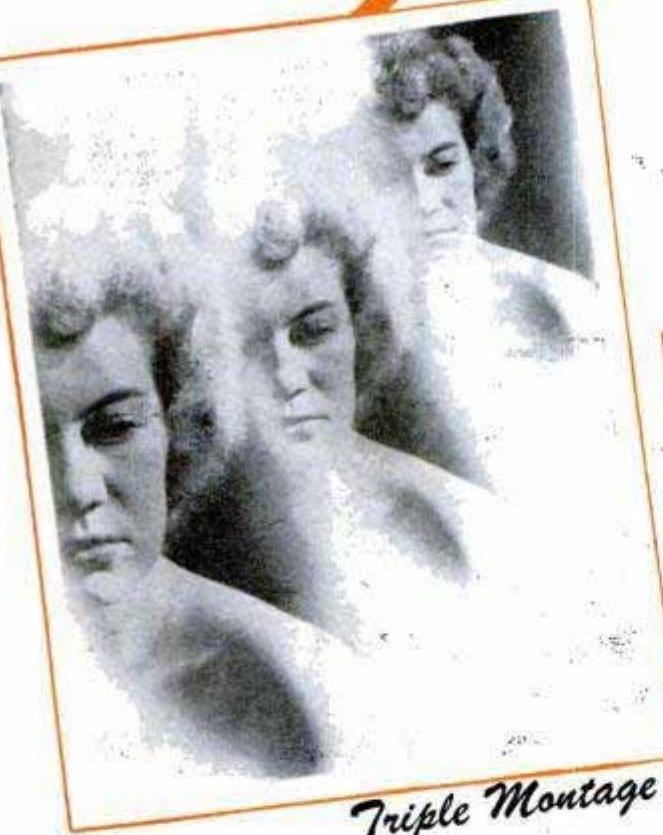
By Russell H. Whitney

by printing directly through a cut-glass object. One method of producing this type of print involves placing the printing paper face up on a flat surface with the negative on top of it and then laying the glass object on top of the negative. A cut-glass ash tray was used to make the original print, the exposure being made from a light positioned above the work. Practically the same effect can be had with the enlarger if one of the glasses of the negative carrier is replaced with a piece of figured glass. Thus, with the negative between the glasses, the same diffused flake pattern will be superimposed on the finished print.

Reticulation: This is another technique which produces an interesting artistic effect. Briefly, it involves a process of expanding and shrinking the emulsion of the film. The print shown was made by combining a reticulated matte with the straight negative and printing both together. The



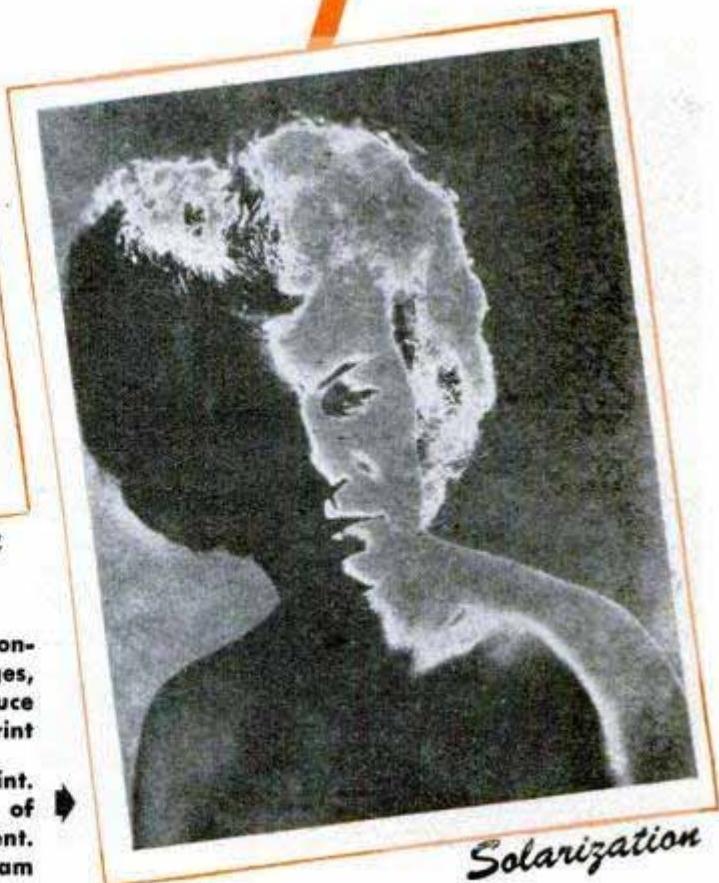
Here's the straight conventional print. While dramatic in itself, compare it with the four different treatments pictured in the prints at left and below. Often, striking effects, such as these, will make a prize-winning print from an otherwise ordinary run-of-the-mill shot



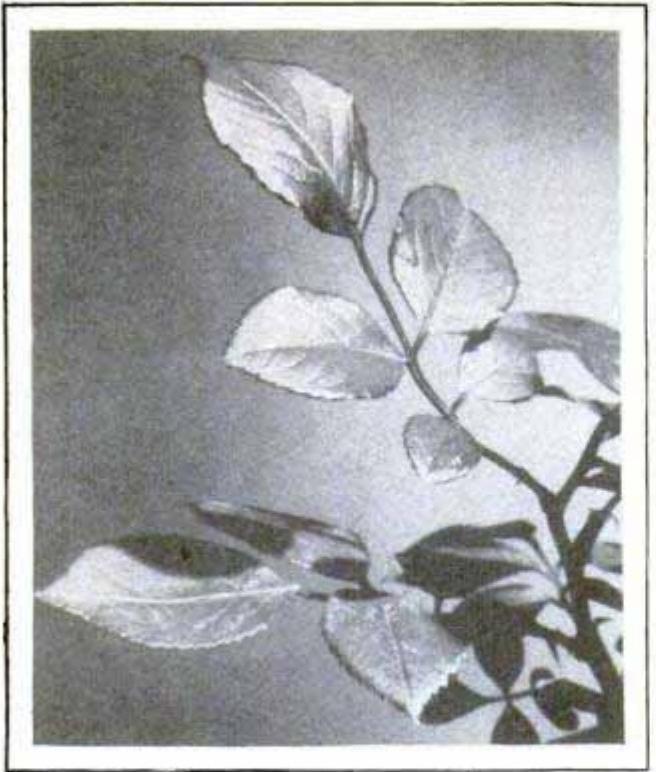
Triple Montage

Offering a relief from a single-image print, a montage, such as the one above, shows how three images, which are printed at diminishing focus points, produce a feeling of third dimension in the finished print

Intriguing effects can be achieved in a solarized print. Such a print involves making a partial positive of the original negative during its initial development. The finished print somewhat resembles a photogram



Solarization



Paper Negative

Here, the finished print consists of a paper negative. Used in the same manner as you would film in your camera, the sensitized paper is exposed and developed in the usual way. Correct exposure is critical

matte is made from cut film which is merely exposed to light and then developed and fixed in the normal way. After this, the film is placed in a tray of warm water of about 130 deg. F. The reticulation process begins with a very fine pattern which becomes increasingly coarse, and you'll find that no two patterns will be exactly alike. The hotter the water, the more rapid the reticulation and, while a high temperature or a long period in the water will finally cause the whole emulsion to slide, careful manipulation of the emulsion will result in some very unusual and attractive patterns. Immersing the film in cold water stops the reticulation of the emulsion. In the case of reticulating a regular negative, it is best to stop reticulation at the point when the pattern is very fine, so that the definition of the image is not lost completely.

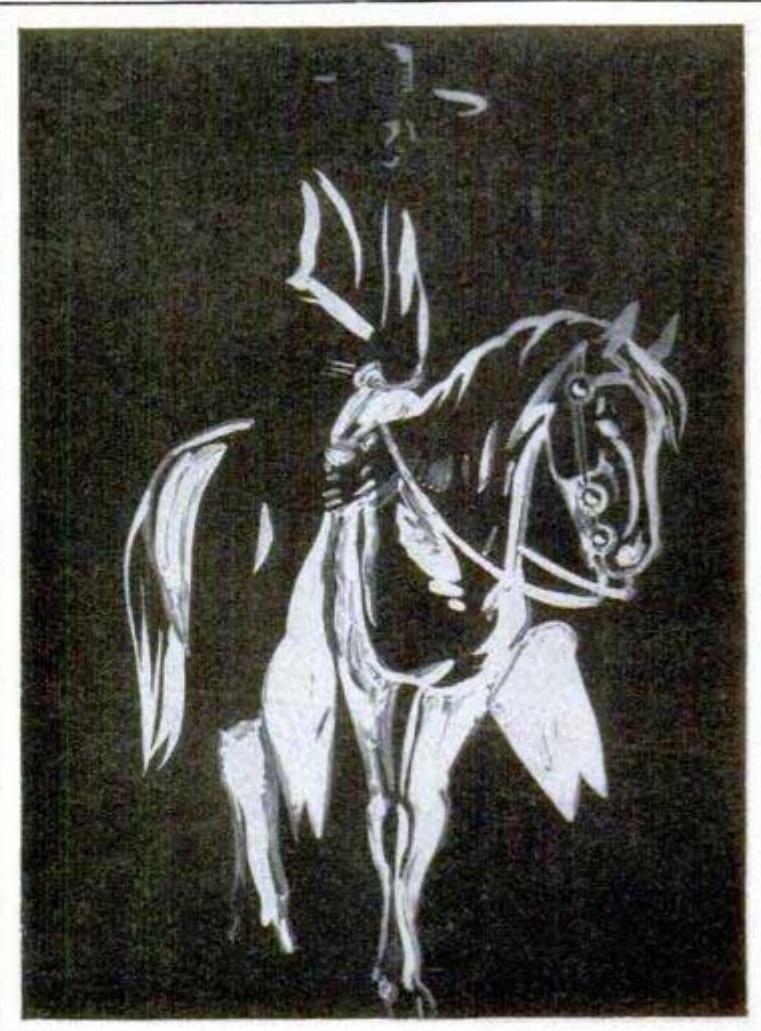
Triple montage: The example picturing this technique was made by vignetting each image at a different focus point of the enlarger. This produces the feeling of third dimension. Each exposure is made separately by covering or block-

ing out all parts of the paper not to be exposed. In other words, for the first image, the entire paper is covered except the part to be printed. Then, to make the second image, the exposed area as well as the unexposed area not to be printed are masked.

Solarization: This process produces a weird and unusual effect. It can be done in two different ways, depending on whether or not you want to save the negative for future use. The most common method used is one where the negative is removed after being partly developed (50 to 75 percent) and exposed again to white light. It is then returned to the developer for complete processing. The result is a partial reversal of the negative image, particularly at points of greatest contrast. The amount of exposure to white light is found by experiment; too much will produce a complete reversal to a positive, while too little will merely fog the negative. A 10-watt bulb at a distance of 6 feet and an exposure of two seconds may prove adequate, but the chances are

Sometimes referred to as a photo-drawing, the photogram is another example of a print made without film. Here, high lights of a drawing or copy are painted on clear glass to produce a "negative"

Photogram



you will have to adapt any set conditions one way or the other because of variance in darkroom setups.

Solarizing a positive paper print is the second method sometimes employed. For this, a high-contrast enlarging paper is used and, after about 50 percent development, and while in the developer, the print is exposed to a 10-watt bulb for two seconds at a distance of 3 feet. The print is removed at the end of the full development period.

Bas-relief: Striking effects can be had in the case of architectural subjects. Here, a bas-relief print is produced by making a positive with a negative. This is done by placing the negative in contact with a sheet of film and exposing as in printing. Then the positive and negative are fastened together with small pieces of tape, one being positioned slightly out of register. It is best that the negative be not too dense and that the positive also be somewhat thin in density. Use a high-contrast enlarging paper, as the over-all tendency is toward flatness.

Paper negative: This treatment may be familiar to photographers who had to resort to the use of photographic paper instead of film during wartime shortages. Making a paper negative involves three things: learning how to use the paper instead of film, which is mostly an exposure problem; knowing how to judge the density of the negative, and knowing what subjects are best suited to the paper-negative treatment. The latter is somewhat a matter of taste. Exposure, however, is best determined by trial and error. Use single-weight glossy paper of fairly low contrast and high speed for best results.

Photogram: Sometimes called a photo-drawing, this type of print is made by painting the image on clear glass with poster color. This is done by placing the original pencil drawing or copy under the glass and painting the outline of the picture on the surface of the glass. The resulting "negative" is used in the regular way in making a print. Painted areas on the glass will become white on a black background in the finished print, such as the example shown.



Plywood-Decked Luggage Carrier Forms Car-Top Photo Platform

Fastening a sheet of plywood to a car-top luggage carrier provides a high platform for taking news pictures over the heads of crowds or scenic shots from a steady vantage point with sufficient room for setting up a tripod. The platform also comes in handy for high-angle shots with only the sky for a background by posing the model on the platform and shooting from the ground. Simply bolt or screw either a $\frac{1}{2}$ or $\frac{3}{4}$ -in. plywood panel to the wooden crossbars of the carrier, fitting it with side and end pieces of solid stock if desired. The latter can be attached to the plywood base with metal angle brackets.

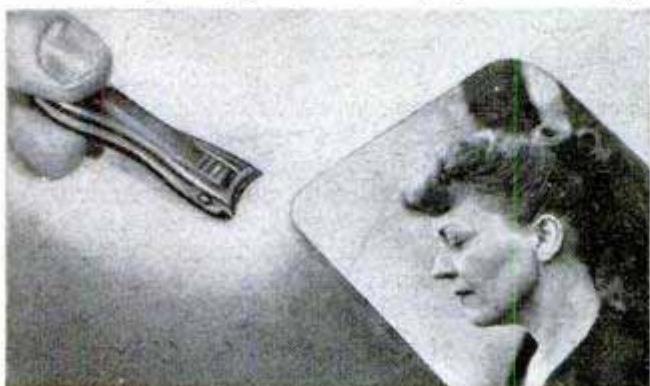
Robert H. Horn, Yakima, Wash.

Focal-Plane Shutter Damaged By Sunlight Entering Lens

Sunlight should never be allowed to enter directly into the lens of a camera having a focal-plane shutter. The lens and shutter are spaced just the right distance apart so that the lens acts as a burning glass, sometimes burning a hole in the shutter or even setting fire to it.

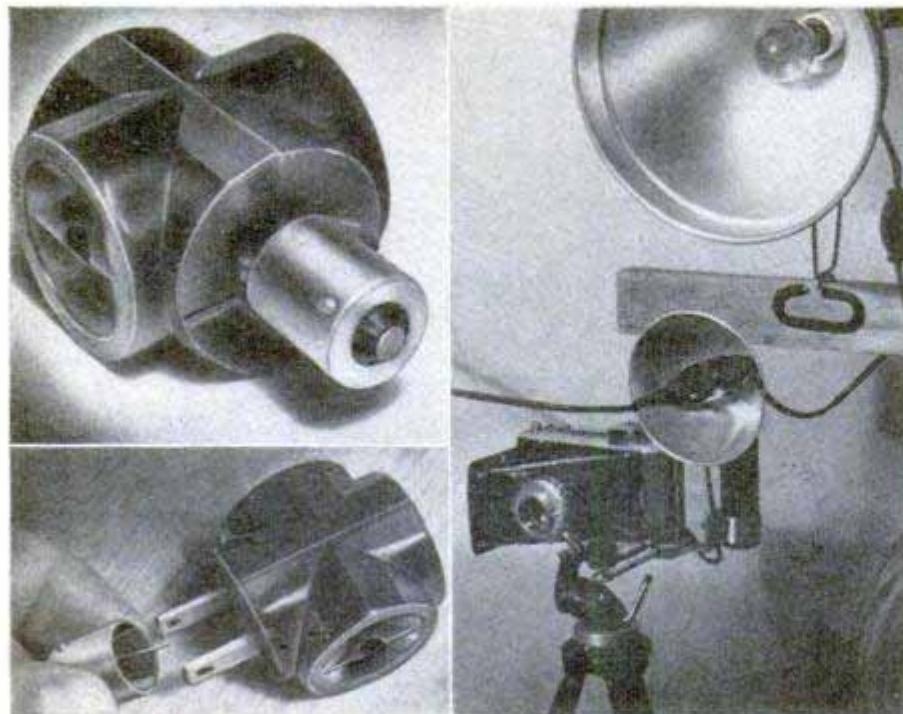
Virginia Hanson, Santa Monica, Calif.

Ordinary Fingernail Clipper Neatly Rounds Corners of Billfold-Size Prints



The appearance of billfold-size prints can be improved and the corners kept from becoming dog-eared by rounding them with an ordinary fingernail clipper. The clipper will snip off the corner of the print in one operation to a uniform radius, and it also can be used to trim the corners of contact prints which are to be glued in a photo album. By carefully tinting the print from which the corners have been clipped, the picture will appear as though it had been made from a color transparency.

Multiple Outlet for Synchronized Flash Gun



Plugged into the bayonet socket of your midget flash gun, this three-way outlet makes it possible to fire as many as three flash bulbs simultaneously. The outlet is made by removing the base from a midget-type flash bulb and slipping it over the prongs of the outlet, one prong first being insulated from the base with a strip of friction tape. The lead from the center terminal of the base is soldered to the insulated prong, while the other prong is soldered to the side of the base. The flash bulbs can be held by your photo-flood reflectors.

Removing Water With Wiper Blade Speeds Drying Negatives

Negatives will dry quickly and free from water spots if excess water is removed with a windshield-wiper blade. First place the film, emulsion side down, on a clean ferrotype tin and brush off the water with a

light sweep of the blade. Next, lift the film from the ferrotype tin and wipe the blade over the tin to remove any droplets of water. Then replace the film on the tin, emulsion side up, and wipe this side.

Books for the Man Who Likes to Make Things

Why suppress that urge to create things—everyone has it, and there is no better way to "work off a little steam." Besides the recreational value of creating or making things with your own hands, you can save money, and maybe even make some in your spare time. What will you make and where will you dispose of it? Making a toy or a game for a child pays off double—not only do you have the fun of making the article, but also the fun of giving it away. If you prefer to make and sell articles at a profit, you still can't go wrong on items that will appeal to children because every parent is a prospective customer who will keep coming back for more.

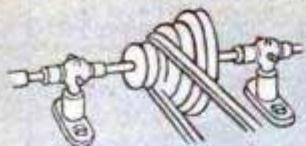
Popular Mechanics book **WHAT TO MAKE FOR CHILDREN** will get you started. Its 110 pages are crammed with things you can make—not just ordinary toys, but articles that other parents have found highly satisfactory. You'll find unusual toys, furniture of all kinds, novelty swings, rocking horses, sandboxes, merry-go-rounds, doll buggies, scooters, etc. Send \$2.00 and this unusual book is yours by return mail.

If you wish to go into the production of children's things for profit, or wish to make things that require tools that are relatively

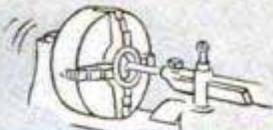
expensive, there's no need to forego this pleasure because of lack of cash. Build your own tools at a fraction of their cost and enjoy the pleasure of not only making things, but also of making your own tools. *Popular Mechanics* book **FORTY POWER TOOLS YOU CAN MAKE** will enable you to have a workshop that heretofore may have seemed impossible. This book gives complete plans and building instructions for bench saws, drill presses, bandsaws, jigsaws, shapers, lathes and many others, every one of which has been built by some enterprising craftsman. Do as 140,000 other readers who have purchased this book. Send \$1.50 and then get that shop started this winter.

If your vocation or hobby is metalworking instead of woodworking, *Popular Mechanics* book **WELDING, BRAZING AND SOLDERING** will give you valuable help. Almost every phase of this work is covered in pictures, diagrams and instructive text so that the most inexperienced person can understand it. Here you will find plans and instructions for making arc and spot welders, soldering torches, muffle furnaces, etc., in addition to articles telling how to weld, solder and braze. Price \$1.75.

All books are available from *Popular Mechanics* Book Dept., 206 E. Ontario St., Chicago 11



Shop Notes



FLEXIBLE-SHAFT UNIT MADE IN THE SHOP

By F. C. Inglehart

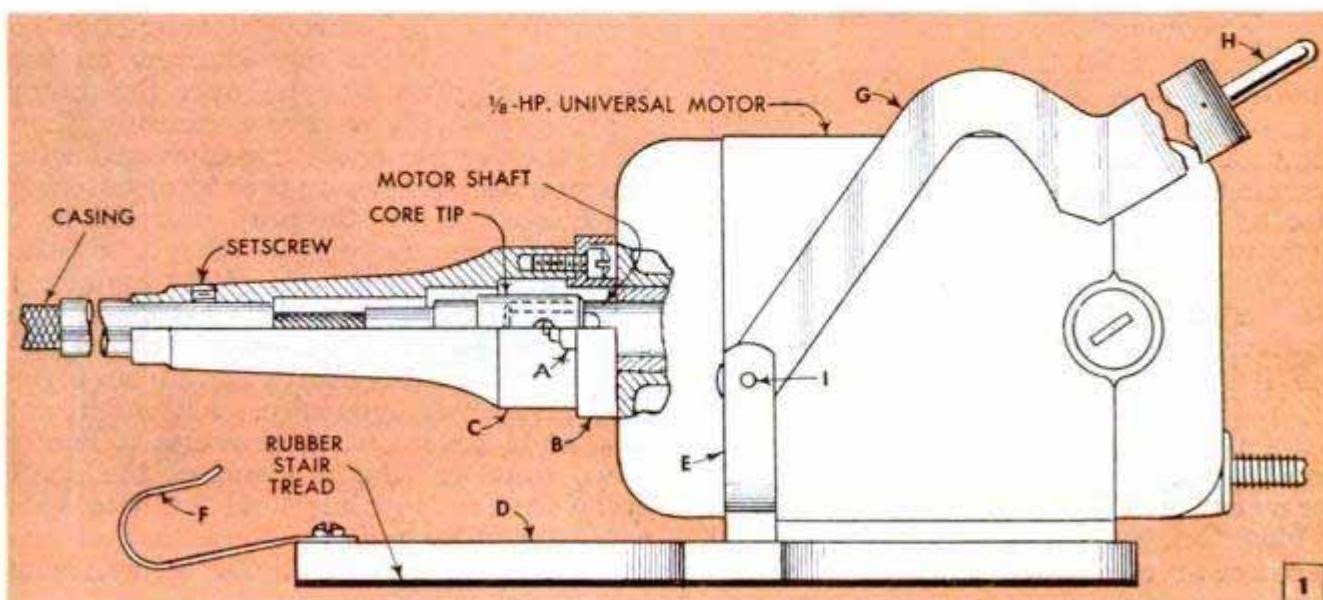
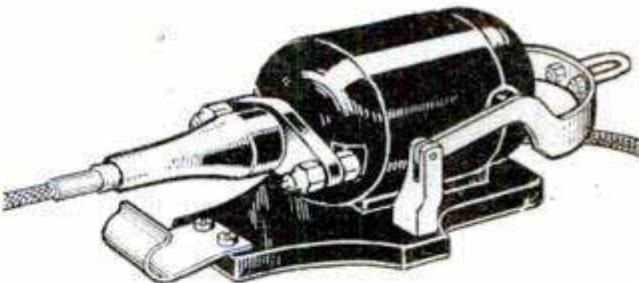
FOR FINE, freehand filing, carving, grinding and drilling on small parts, you can't beat a high-speed flexible shaft having a suspended, direct motor drive. By using a small stock motor, such as a $\frac{1}{8}$ -hp., together with a flexible shaft and making other necessary parts yourself, it is comparatively easy to assemble such a unit as that shown in Fig. 1. The motor and shaft are assembled as a unit, using a special ferrule and flange, and then the motor is attached to a base plate fitted with a bail which permits the shaft and motor to swing free when suspended from an overhead hook. In addition to the bail, the base features a nonslip surface to permit using the unit in a horizontal position.

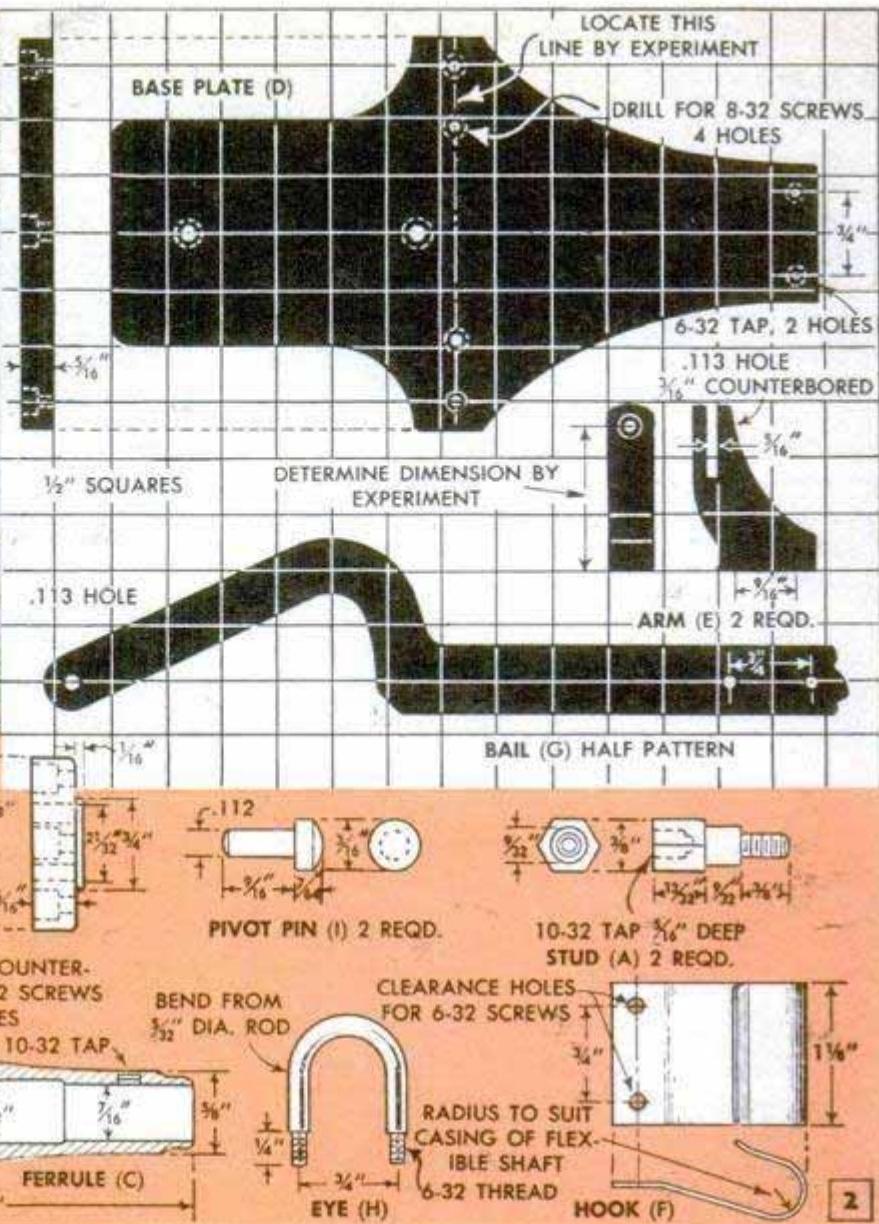
The base, D, is made from a $\frac{1}{16}$ -in. steel plate sawed and filed to the contour shown in Fig. 2. Drill and counterbore holes for mounting the motor and the bail arms, E. The bail is shown in half pattern and is made from 16-ga. steel. After forming and drilling holes for the pivot pins, I, and the eye, H, the eye is bent to a U-shape on a center line midway between the two holes.

The tricky part of the whole assembly is fitting the shaft to the motor. Most small flexible shafts are supplied with a ferrule internally threaded to fit a motor already



Hang it up or use horizontally





adapted to this purpose. To adapt this type of shaft to a stock motor may require a new ferrule with walls of sufficient thickness to permit drilling and tapping for 6-32 screws. Fig. 2, detail C, shows how a ferrule is machined from $1\frac{1}{2}$ -in. round steel by contour turning and counterboring to get the required size and wall thickness at the large end. The new ferrule is faced off in the lathe to fit against the shouldered face of the flange, B, Fig. 2. Note that the dimension of the large internal bore of the ferrule corresponds with the outside diameter of the shoulder on the flange but in turning and fitting the parts, an allowance of .001 in. should be made for clearance. Holes spaced 90 deg. on a 1-in. circumference are counterbored from the back of the flange to take 6-32 machine screws flush. Holes on the same spacing are drilled and tapped in the large end of the ferrule, and the two parts are joined with machine screws as in the upper left-hand photo.

Mounting screws, or studs, are shouldered down on $\frac{3}{8}$ -in. hex rod to the dimensions given in detail A, Fig. 2. The hex head

of each screw is then center-drilled from the end and tapped 10-32. Then the crown nuts are removed from the long studs that hold the end shields on the motor and the mounting screws are substituted and turned up tightly. Now, slip the ferrule over the end of the flexible-shaft casing and pull the shaft through far enough so that you can reach the setscrew on the adapter. Slip the adapter over the motor shaft, tighten the setscrew securely, then slide the ferrule and flange forward with the mounting screws on the motor entering the holes drilled in the projections, or legs, of the flange. Tighten 10-32 nuts on the projecting threaded ends of the mounting screws. Then turn a 10-32 setscrew into the tapped hole at the small end of the ferrule to prevent the shaft casing from turning, and there you are. Although not essential, the hook, F, provides a handy place to store the free end of the shaft when it is not in use. Bend the hook to a radius slightly smaller than that of the shaft handpiece so that the latter will snap into it and be held securely.

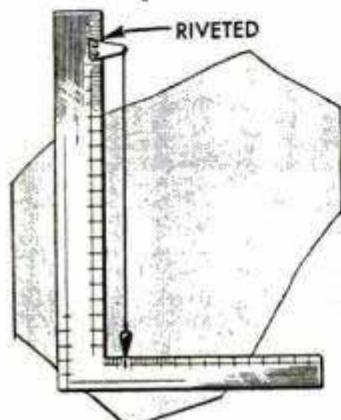
Build This Easy-Rolling Handcart To Save Steps at Feeding Time

With this wooden, two-wheel cart, a good many steps can be saved in feeding livestock in feed lots located some distance from the granary or crib. The top half of the grain-tight box is removable. Large implement wheels turning on solid axles make the cart easy to maneuver on rough ground with a heavy load. The rear end has a divided endgate with a handgrip for raising each section. By setting the axle slightly ahead of the center of the bed, the cart will not tip with an uneven load or when scooping out feed. A support, built from flat iron, fastened under the rear end will allow the cart to set level.

A. M. Wettach, Mt. Pleasant, Iowa.



Steel Square Provides Level



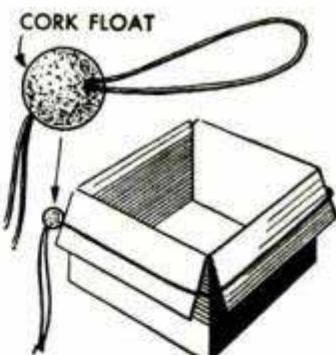
By adding a plumb bob to a carpenter's steel square, a sensitive level can be obtained. The plumb bob is tied to a sheet-metal tab riveted to one arm of the square, and an index mark is made on the inner edge of the other arm. Thus, when

the square is held so that the arm on which the plumb bob is mounted is vertical, the surface under the adjacent arm will be level when the plumb bob is aligned with the index mark. The square also can be used to determine plumb by holding the vertical arm against the surface to be checked.

W. F. Schaphorst, Newark, N. J.

Loop Tightened by Cork Float Holds Carton Flaps Open

To hold the cover flaps of paper cartons open while packing merchandise, a loop of heavy cord inserted through a hole punched in a cork float can be used in the manner shown. The twine fits snugly in the cork so that the loop may be drawn around the opened flaps to hold them securely. Pulling the cord back through the float slackens the loop, making it easy to remove.—G. E. Hendrickson, Argyle, Wis.



Shelter Houses Gasoline Storage Tank and Lubricating Oil



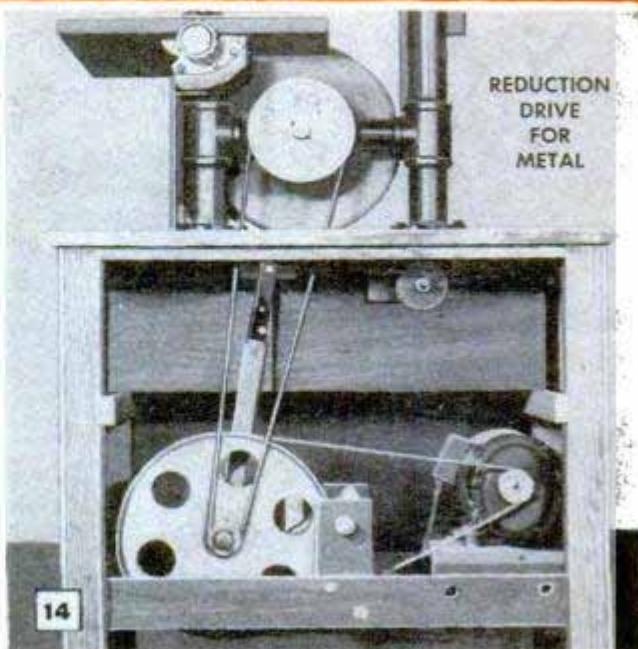
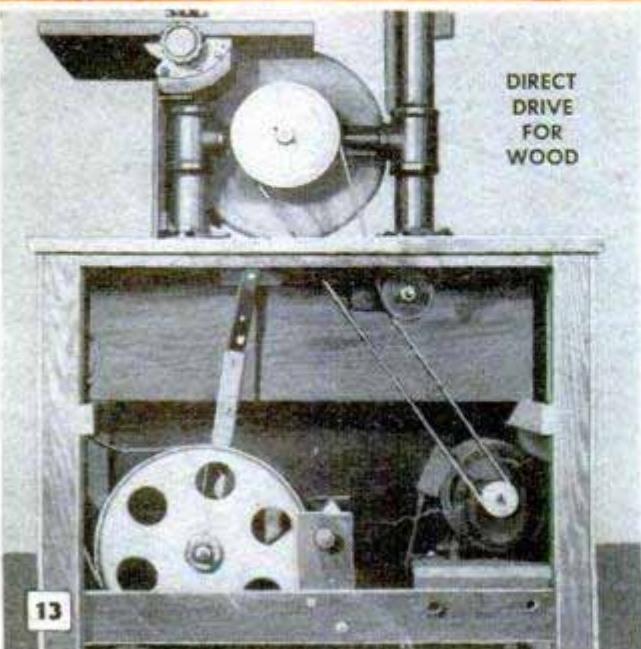
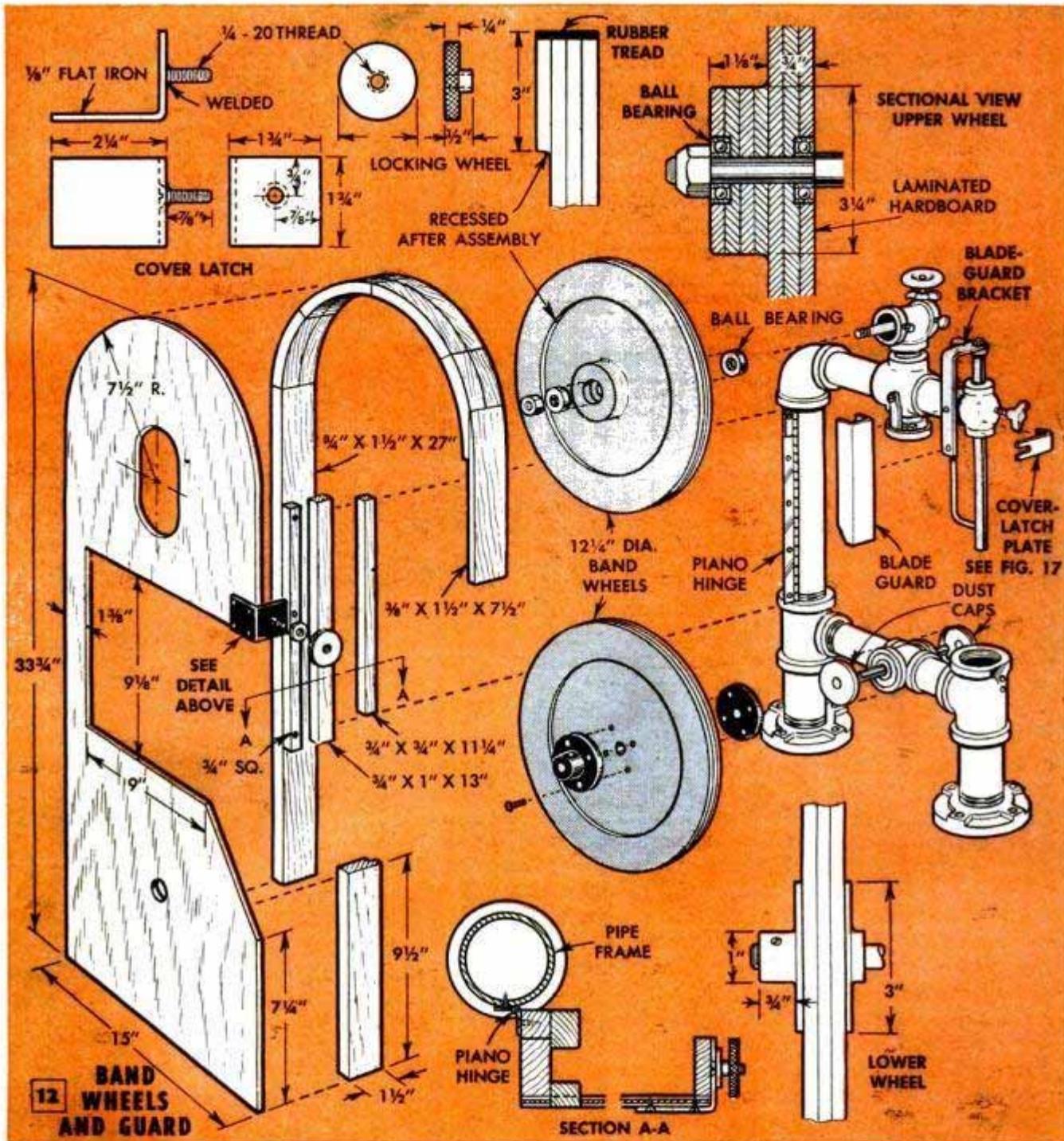
Built over a 300-gal. gasoline storage tank, this shelter house affords protection for the filler hose and additional storage space, under lock and key, for lubricating oil, measuring cans and other supplies. The shelter house makes it possible to store all flammable oils and gasoline at a safe distance from other farm buildings.

L. H. Houck, Jefferson City, Mo.

Welding Cast-Iron Parts

When beveling the edges of cast iron prior to welding, heat the edges to a dull red before grinding. This will prevent graphite, ordinarily brought to the surface by grinding, from interfering with welding.

Ernest A. Iversen, Westchester, Ill.

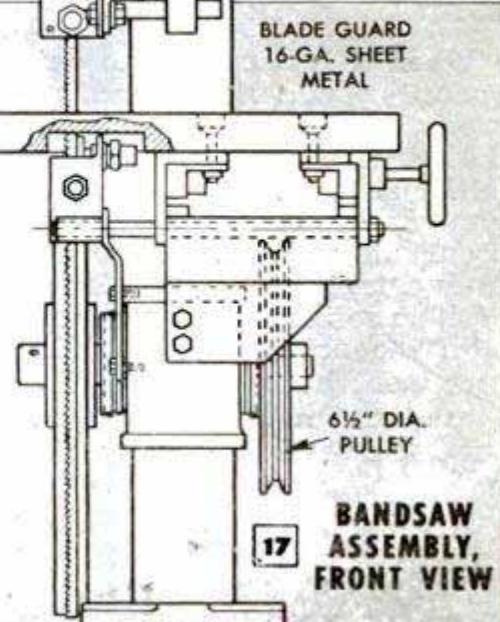
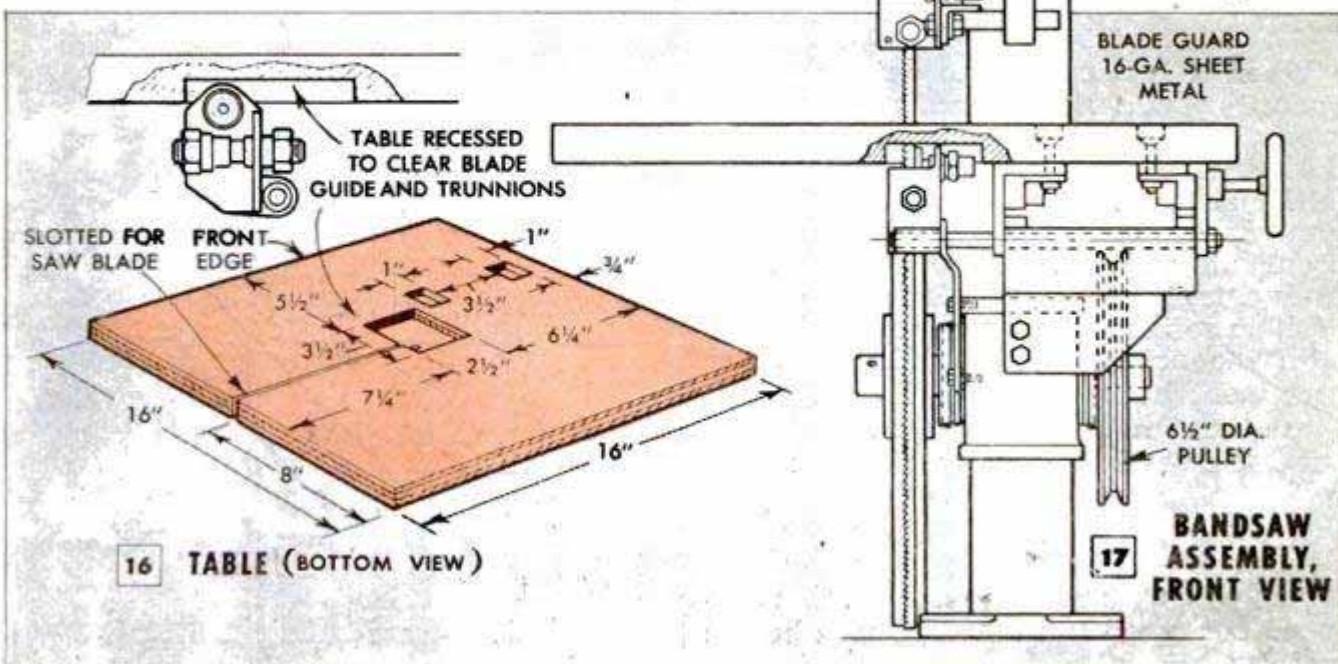
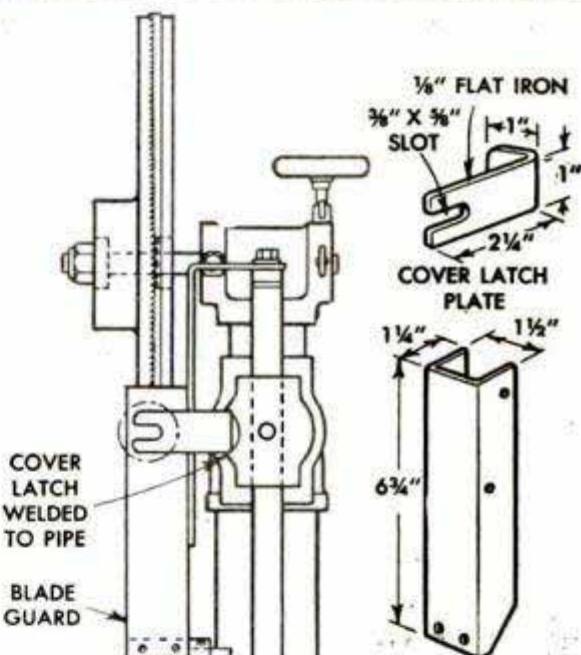
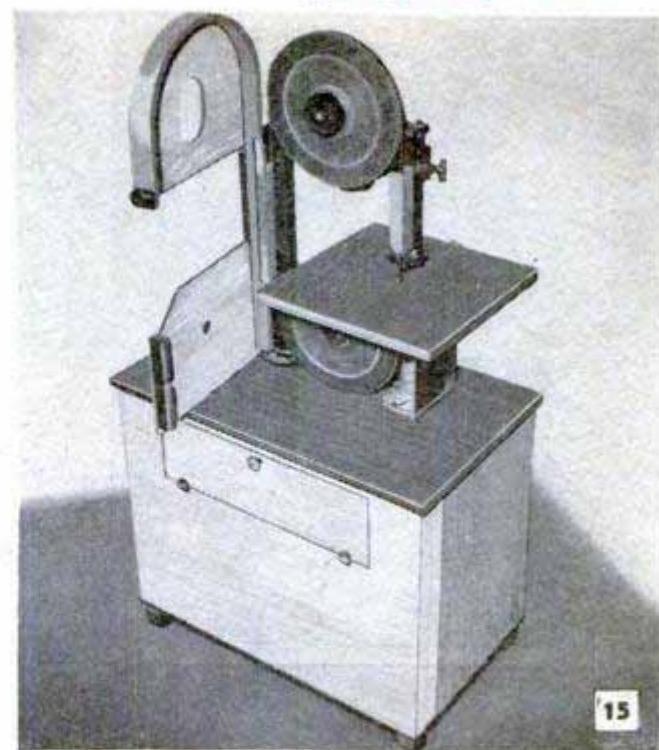


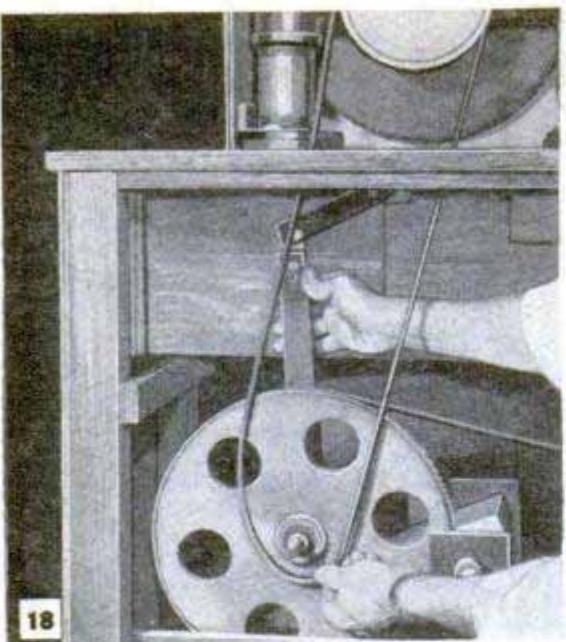
TWO-SPEED BANDSAW

By A. L. Mills

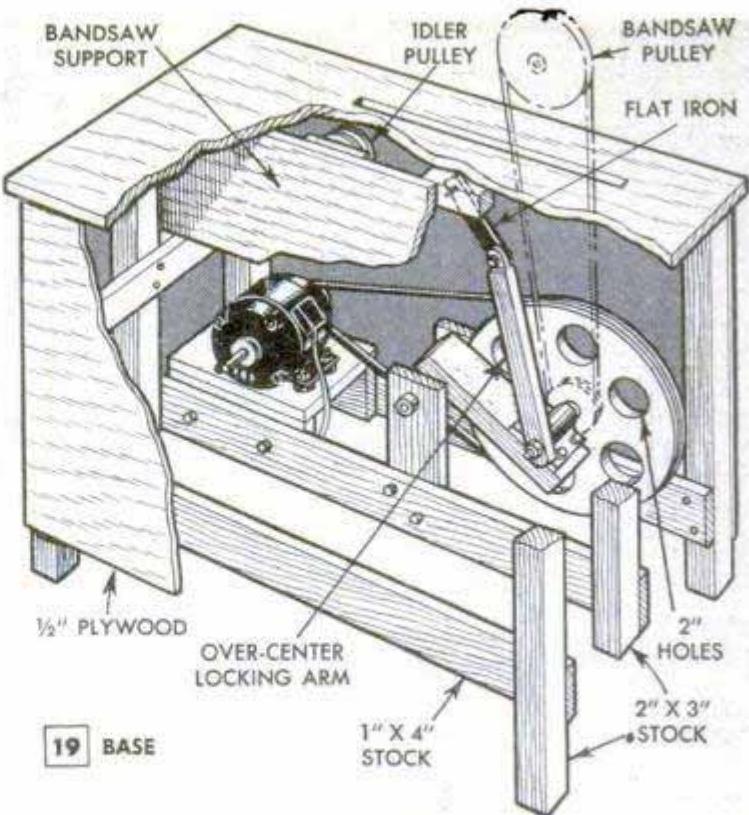
Part II

AFTER making the frame, guides and table trunnions described in Part I last month, the two-speed bandsaw is completed by making the band wheels, table, guard and floor stand which houses the drive. The finished job is shown in Fig. 15. The band wheels are made of $\frac{1}{4}$ -in. hardboard, three disks and one ring of this material being laminated to give a 1-in. tread width, Fig. 12. The hub of the upper wheel is built out with four additional disks of hardboard to provide a bearing mounting as in the sectional view, Fig. 12, while the lower wheel hub is made from two $\frac{1}{2}$ -in. pipe flanges as indicated. Before mounting, the wheel treads are trued in a lathe and fitted with 1-in. rubber tires. The hub of one lower-wheel flange is drilled and tapped for a setscrew which is tightened onto a flat filed on the shaft. The table, Fig. 16, is made from $\frac{3}{4}$ -in. birch plywood and is recessed on the bottom side to fit over the trunnions and blade guide. It also is slotted from one edge to the center to permit insertion and removal of the blade. Fit the table to the trunnions before cutting the slot so that the location of the latter can be determined. The $\frac{1}{4}$ -in. plywood wheel guard, or cover, detailed in Fig. 12 is not essential, although you can include it if desired. However, the blade guard, Figs. 12 and 17, is a necessary safety feature and

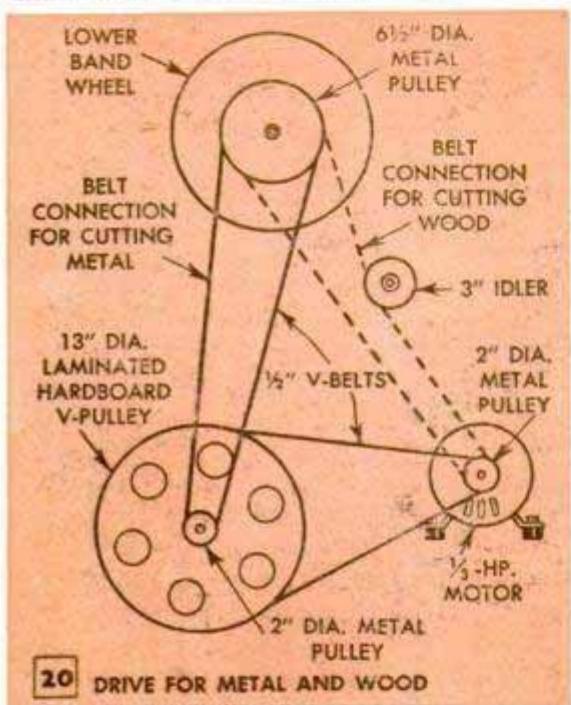




18



19 BASE



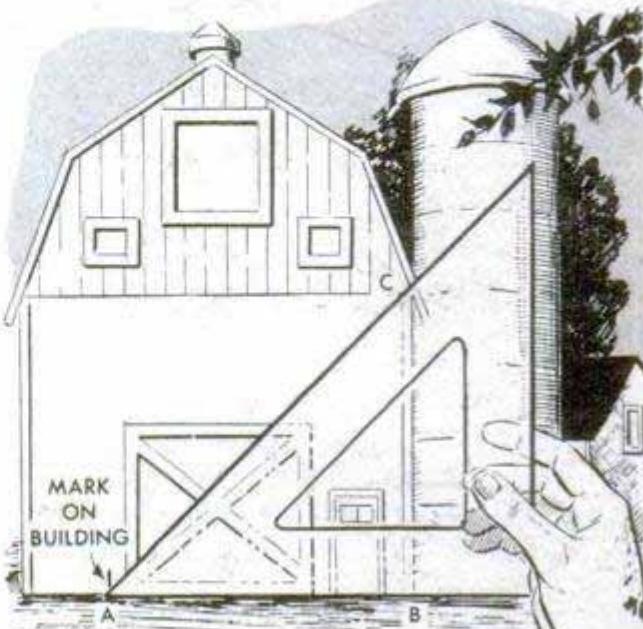
20 DRIVE FOR METAL AND WOOD

should not be omitted. Figs. 13, 14, 18 and 20 show how the drive is assembled for cutting wood and metal. Fig. 19 details the closed stand and pivoted jackshaft. Of course, an open stand, 30 in. high, will serve equally well. The jackshaft is raised for changing belts by a special lever, pivoted at the ends and center as in Fig. 18. The lower end is provided with a bushing to fit the jackshaft. Two pillow-block bearings placed side by side can be used as a jackshaft bearing in place of the single bearing shown. Also, a 12-in. metal V-pulley may be substituted for the 13-in. laminated pulley. Before operating the machine be sure the blade is centered on the band wheels and is bearing lightly against the blade guides.

THE END

Estimating the Area of Buildings When Painting or Repairing

When it is necessary to determine the quantity of material needed for painting or repairing houses, barns or other buildings, the height of the structure can be estimated fairly accurately without leaving the ground, thus enabling you to find the approximate wall area. Hold a draftsman's 45-deg. triangle at arm's length and in a position so that the bottom edge coincides with the bottom of the siding or other prominent horizontal line. Then walk to the left or right until the sloping edge of the triangle crosses the high point to be measured. Holding the triangle stationary at this point, have a helper make a mark on the building where the sloping side of the triangle touches the base line, A. The distance measured from A to B will be the same as the vertical dimension from B to C.



Clearing of Waste Land Speeded By "Swing" Saw on Tractor

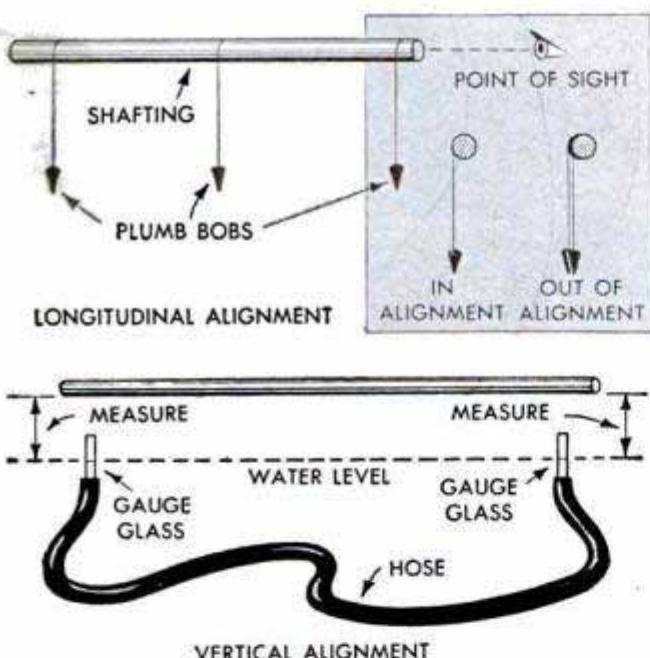
To solve a special problem in clearing waste land of thick, low undergrowth, one farmer designed this unusual "swing" saw. The supporting frame consists of a 2 x 12-in. plank and the power take-off drive is direct to an angle head of the type used on tractor-driven posthole augers. The head is bolted to a heavy angle bracket attached to the outer end of the plank support. The completed unit pictured pivots on the tractor drawbar and is raised and lowered by the hydraulic lift. The handle, operated by a man on the ground, is used to swing the saw blade in an arc when clearing land of small brush and sprouts.



Plumb Bobs and Garden Hose Combine to Align Shafting

Shafting can be accurately aligned longitudinally by suspending three plumb bobs, all from the same side of the shaft, and sighting along them as shown in the detail. If the shafting is long and the plumb bobs

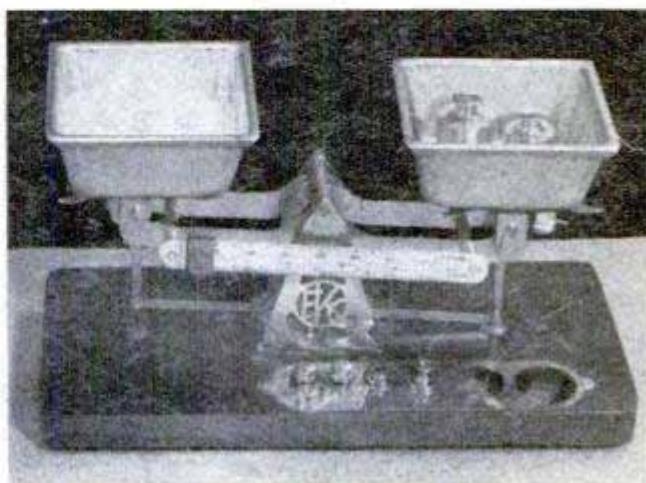
far apart, a string is stretched horizontally, close to the outer plumb-bob cords. This allows any misalignment to be accurately checked by measuring from the center plumb-bob cord to a point on the string directly opposite. The plumb bobs suspended in this way are perfect tangents to the shaft. By deducting one half the diameter of the shaft, its exact center for its full length can be accurately indicated on the floor. For the vertical alignment of the shaft, to make sure it is level, an ordinary garden hose filled with water may be used. Gauge glasses are inserted in the hose ends which are temporarily mounted directly under the shaft. With the water seeking an accurate level in each end of the hose, regardless of its length, measurements can be made from the shaft to the surface of the water in the gauge glasses as indicated in the detail. To indicate an exact level with this method, the hose must be completely filled with water, eliminating all air from inside. Also, the temperature of the water must be the same from end to end or the improvised level will not be accurate.



Muffin Tins Provide Large-Size Scale Pans for Weighing Bulk Chemicals

Large quantities of light chemicals can be weighed on a small balance if individual muffin tins are substituted for the regular pans supplied with the scale. If only one muffin tin is available the scale must be balanced when the tin is empty.

Julian A. Belin, Bronx, N. Y.

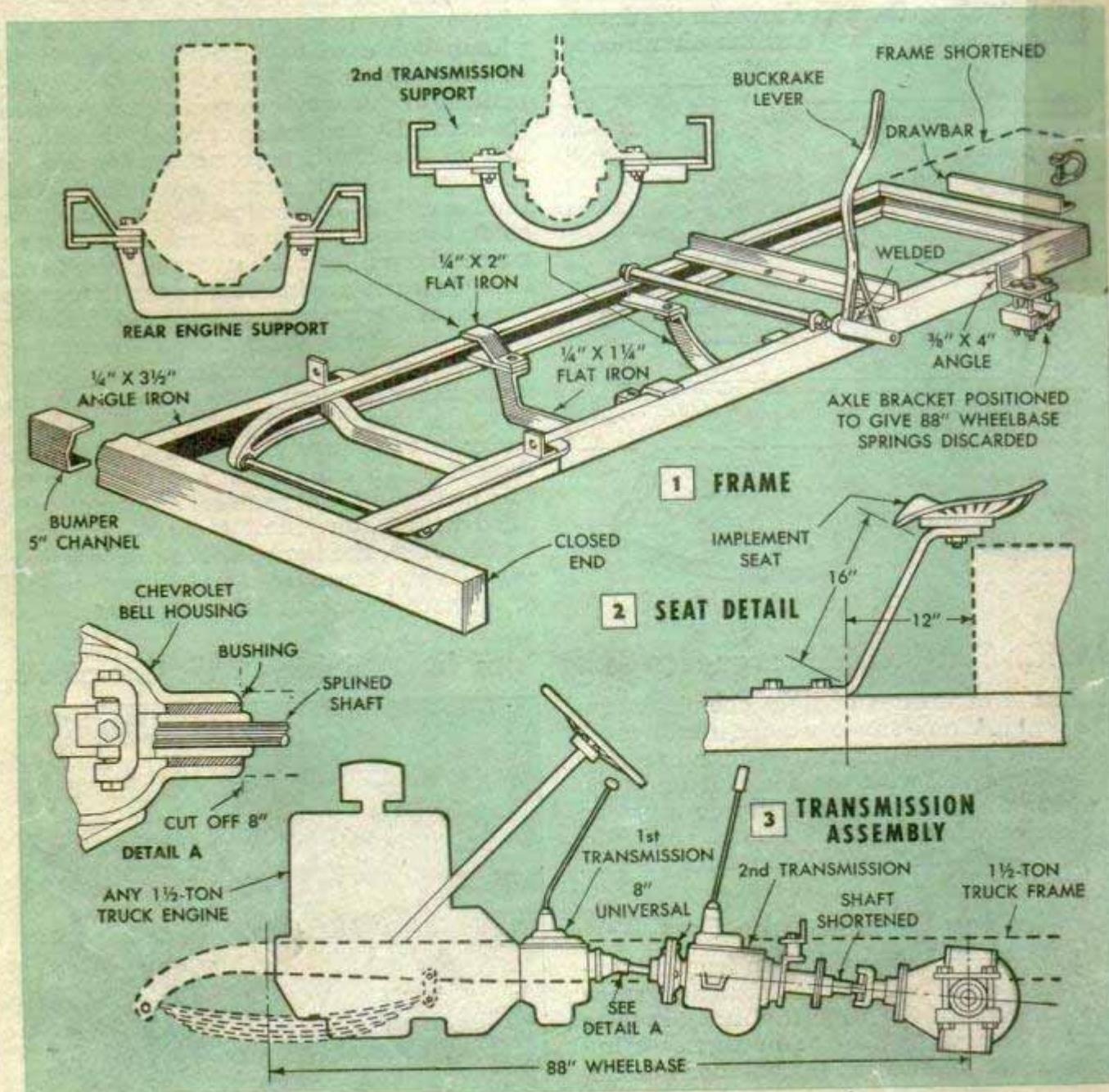


Lubricating Cement-Tube Cap

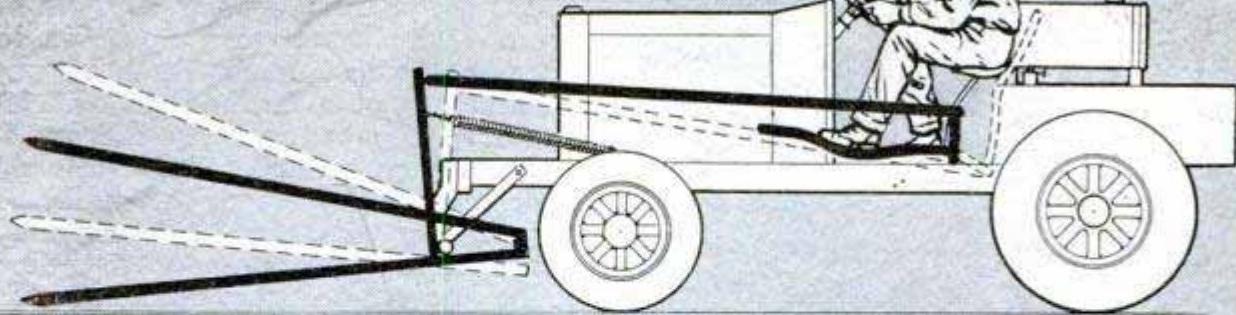
In order to prevent the cap from "freezing" on a tube of gasket cement, grease the threads of the tube the first time the cap is removed. Use the hard grease intended for application to car-door latches.



Although this improvised tractor is especially suited for use with a buckrake, it also is fitted with a conventional drawbar and will handle any pull-type implement within its capacity. Frame is cut down to shorten wheelbase and is fitted with a weight box in which weights may be placed to balance the buckrake.



WHEN PICKING UP LOOSE HAY, OPERATOR PRESSES LEVER DOWN WITH FOOT. WHEN LEVER IS RELEASED, SPRINGS LIFT LOAD CLEAR OF GROUND. PULLING LEVER BACK RAISES RAKE FOR ROAD TRAVEL



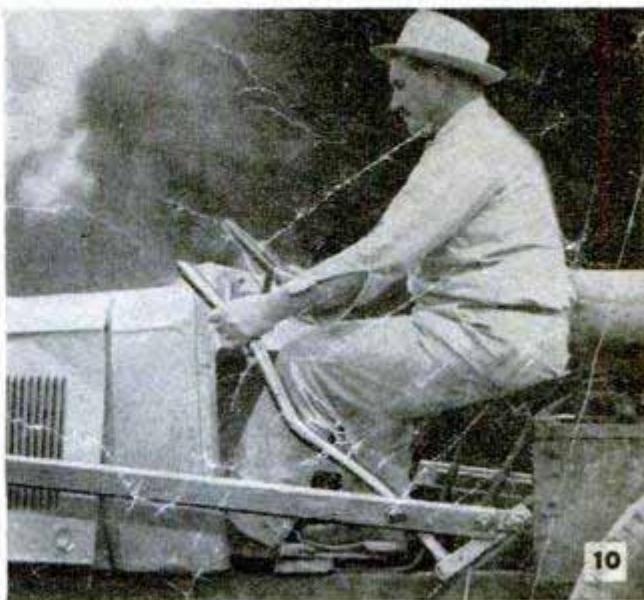
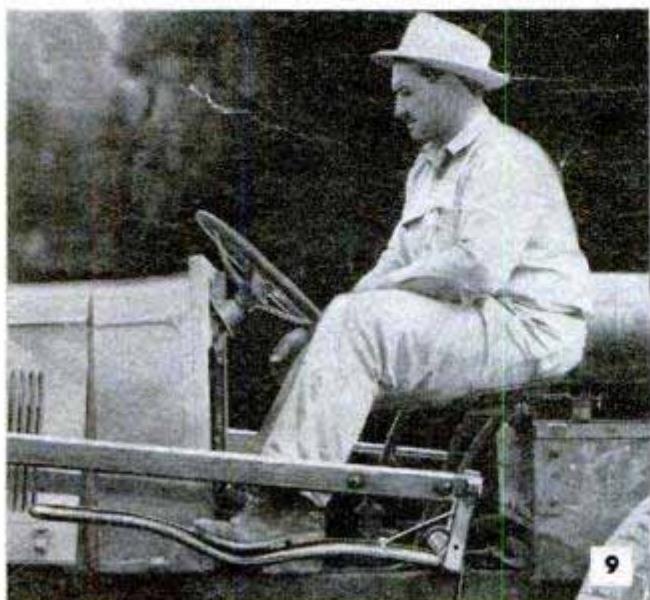
in detail A. A weld retains the bushing. This method permits the short splined shaft to move back and forth in its original sleeve, which turns inside the bushing. In some cases, it will be necessary to install a grease fitting in the universal housing as pictured in Fig. 5.

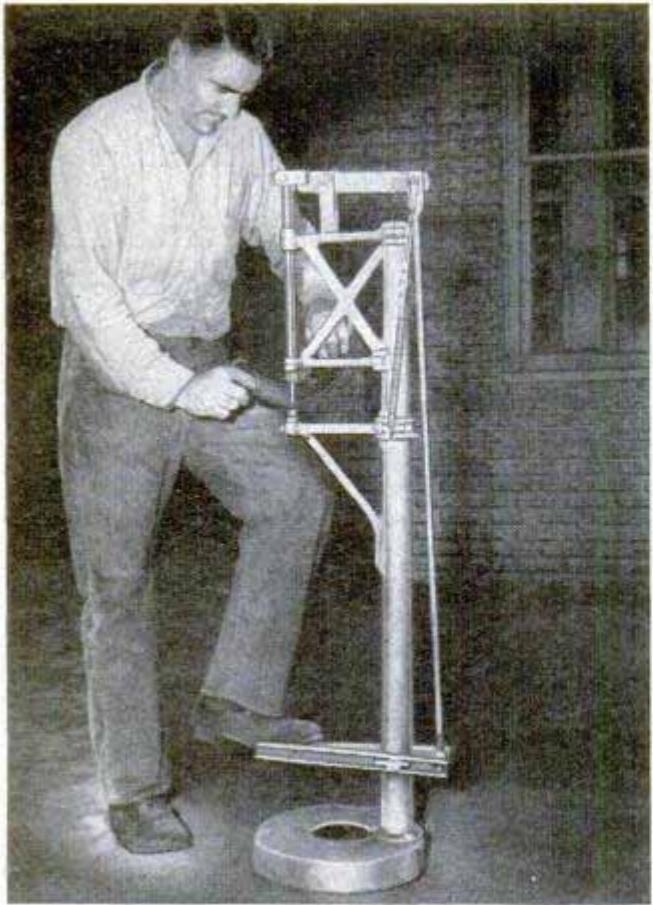
In some older-model trucks, the engine is mounted in the horizontal position, or very nearly so. Splash lubrication of the engine made this necessary. Newer types of engines having forced lubrication from a crankcase sump can be tilted to bring the drive shaft and dual transmission more nearly in line. This position of the engine not only will greatly reduce wear in the transmission assembly, but also will cut down power loss resulting from frictional drag. The front springs should be in good condition, as they carry a greater part of the load when the buckrake is used.

After the engine and transmissions are in place, the rebuilding job is completed by adding the fuel-tank brackets, weight box, driver's seat, Fig. 2, and the lever to control the buckrake. These parts are detailed in Figs. 1, 6 and 8 and pictured in Figs. 4, 9 and 10. The shaft on which the buckrake

control lever is mounted is a length of pipe held in place by two U-bolts which serve as bearings. A crank arm, 8 in. long, is welded to one end of the shaft. The lever, also a length of pipe, has a 2-in. bend at the center to form a footrest. It is welded to the pipe shaft just back of the arm and perpendicular to it, as in Fig. 4.

The construction and dimensions of the original weight box are detailed in Fig. 6, and the buckrake attachment, which is especially designed for this type of tractor, is detailed in Fig. 7. The weight box is made of hardwood and lined with heavy sheet metal, and the top edges are protected with angle iron. On the original tractor the fuel tank is supported above the weight box in cradles made from flat iron bolted to 2-in. steel channels. Some changes in the location and size of these parts may be necessary on different types of trucks. Note in Figs. 7 and 8 that the buckrake is counterbalanced by a heavy coil spring, which gives the necessary flexibility between the rake and tractor when the unit is operated over rough, uneven ground. One end of the spring is anchored with an eyebolt to provide a means of adjusting the tension.



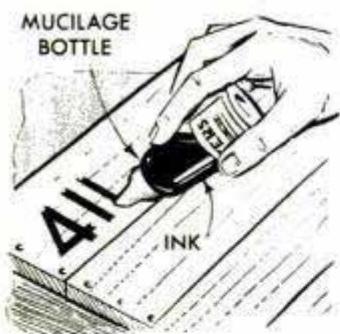


Riveter Speeds Lining Brakes

Specially made to speed up the job of riveting new linings to old brake shoes, this riveter is constructed largely of auto and truck parts. The base is an old brake drum to which a length of pipe is welded to form a column to support the moving parts. The riveting plunger and anvil are carried on three connecting rods, the wrist-pin ends of which form bearings for the plunger and a rigid support for the anvil. A flat-iron X-brace is welded between the two upper connecting rods and the outer end of the lower one is supported on an angle-iron brace, the lower end of which is welded to the column as pictured. An auto steering tie rod connects the treadle with a pivoted arm at the top of the column which actuates the plunger. The machine also can be used for other types of riveting jobs such as leatherworking and harness making, thin sheet-metal fabrication and model building in the home shop.

Ink-Filled Mucilage Bottle Marks Shipping Crates

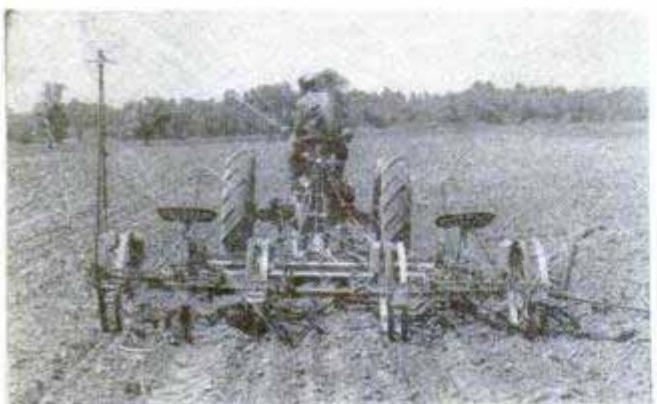
Filled with ink or paint, a spreader-type mucilage bottle becomes a handy, self-feeding brush for marking shipping crates.



The rubber bottle cap is pressed against the crate and the letters are formed in the same way as in spreading mucilage, drawing the bottle cap with an even pressure across the wood surface.

Angle-Iron Hitch on Tractor Drawbar

By mounting a special angle-iron hitch on the tractor drawbar, many farmers utilize two older-type two-row corn planters



Weatherproof Hen Coops

A 55-gal. steel drum cut in half provides the roofs of these weatherproof coops for setting hens. Each drum half is coated with aluminum paint and nailed over a box in which a small opening has been cut to serve as an entrance.

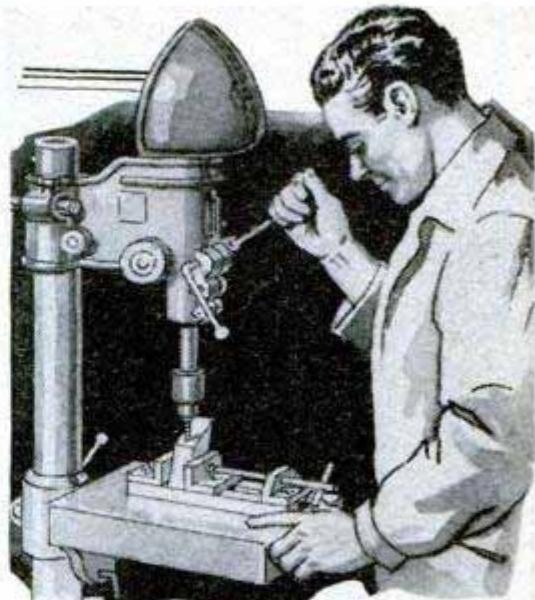
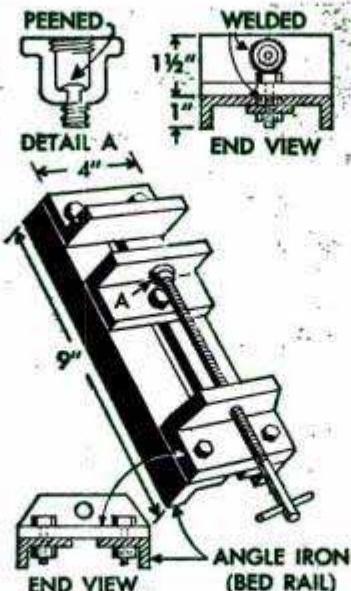


Permits Towing Two Corn Planters

to make a four-row planter which will operate satisfactorily at moderate tractor speeds. To maintain correct row spacing, the planter axles are joined together with a short length of shafting having a universal at each end. The seed-plate shafts also are joined in the same manner so that one planter wheel can drive all four plates to give an accurate drop from the check wire. Pins, or keys, are removed from the other three planter wheels so that they turn freely on the axles to give the necessary differential for short turns at headlands. Hydraulic cylinders of the type used on tractor cultivators raise and lower the planter shoes.

Just the thing to hold irregularly shaped work for drilling, this inexpensive drill-press vise is made from angle iron and a length of rod. Lightweight angle, such as bed rail, can be used for the ways of the vise, while heavier angle having a $\frac{3}{8}$ or $\frac{1}{2}$ -in. thickness is used for the vise jaws and screw plate. The stationary jaw and the plate are bolted to the ends of the ways so that they serve as spacers to hold the ways about $\frac{1}{2}$ in. apart. The rod is threaded for almost its full length to form the vise screw, and the unthreaded end is drilled for a short piece of rod which provides a handle. The plate is drilled and tapped to take the screw and the movable vise jaw is anchored to the ways by means of a bolt, nut and washer, as shown in the upper right-hand detail. The movable jaw is coupled to the screw with a pipe cap. A tenon, which is

Drill-Press Vise Made From Angle Iron and Rod Excellent for Handling Irregularly Shaped Work



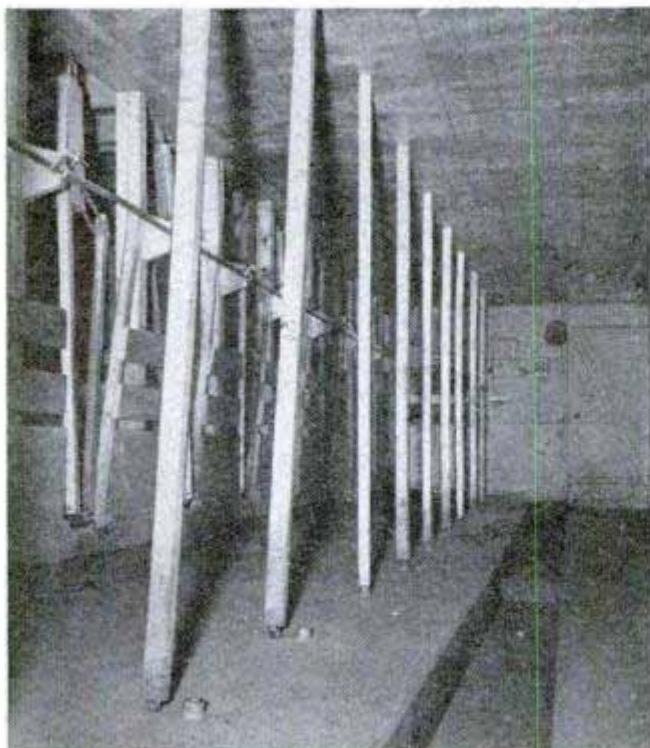
turned on the end of the screw, is inserted through a hole drilled in the top of the pipe cap. Then the tenon is peened over to hold the cap in place as in detail A. The edge of the pipe cap is simply welded to the movable jaw, being aligned with the hole in the screw plate.—James J. Kane, Chicago.

Wooden Poles Set in Dairy-Barn Floor Form Removable Stall Partitions

Installed in the dairy barn at considerably less expense than the permanent pen-type stall, these simple pole partitions have the advantage of being easily removed for cleaning. When making the installation pictured, short lengths of $1\frac{1}{2}$ -in. pipe were embedded in the concrete floor about 18

in. back of the gutter and equally spaced between the stanchions. Short round tenons are cut on the lower ends of oak 2 x 2s and square holes are cut in the ceiling directly above the pipe sleeves to take the upper ends of the poles. In use, the top ends of the poles are inserted in the square holes and the tenons on the lower ends are fitted into the pipe sleeves in the floor. The poles are removed by simply lifting each one slightly to disengage the tenon and then drawing the upper end out of the square hole in the ceiling.

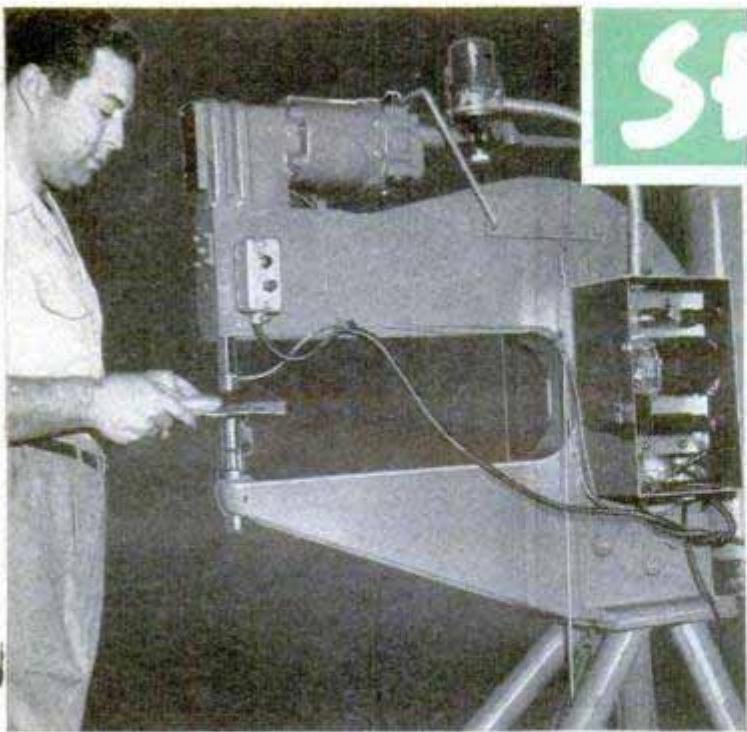
Grover Brinkman, Okawville, Ill.



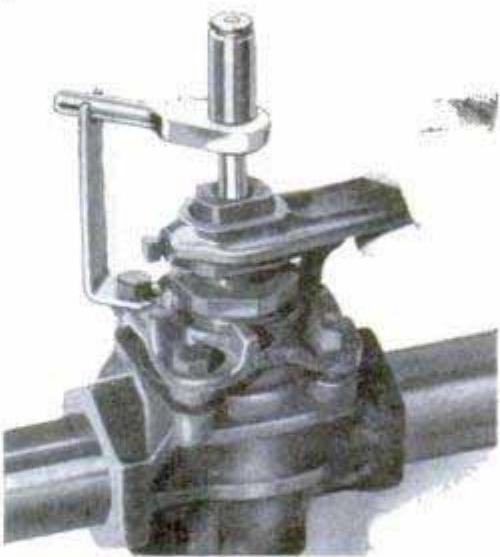
Testing Mixed Antifreeze Solutions

To obtain an accurate check of the freezing temperature when two or more different antifreeze solutions are mixed together, one garage man checks the solution by placing a sample in his home freezer. If the sample does not freeze at 0 deg. F., he knows that it is safe to use at this temperature. However, if it does freeze, he allows the sample to thaw and checks the temperature with a thermometer when the solution "slushes." This is the freezing temperature of the solution.

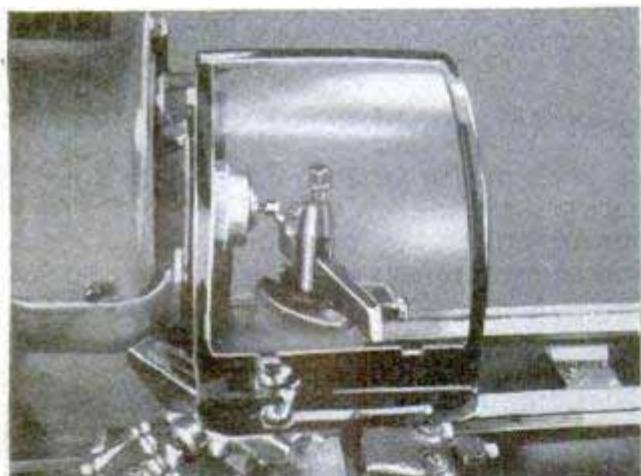
¶A common pin provides a substitute for the lost pin of a drawing compass.



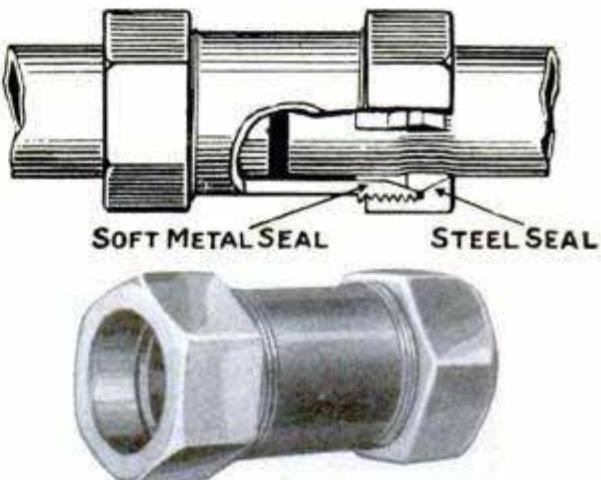
ELECTRONIC SAFETY DEVICE for pneumatic riveters, punch presses, shears and brakes stops machine instantly if operator gets finger under or between moving parts. As metal touches finger, electrical conductivity of flesh closes a circuit, energizing a solenoid which closes a valve or throws line switch



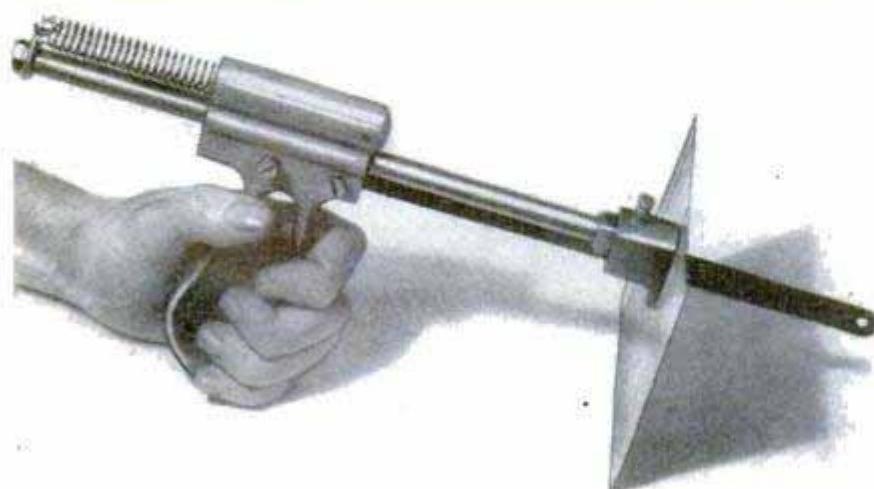
PLUG-VALVE LUBRICATOR fits any lubricated plug valve from $\frac{1}{2}$ to 20-in. size. The three parts are made of stainless steel and are attached without altering valve. Works automatically when valve is opened and closed



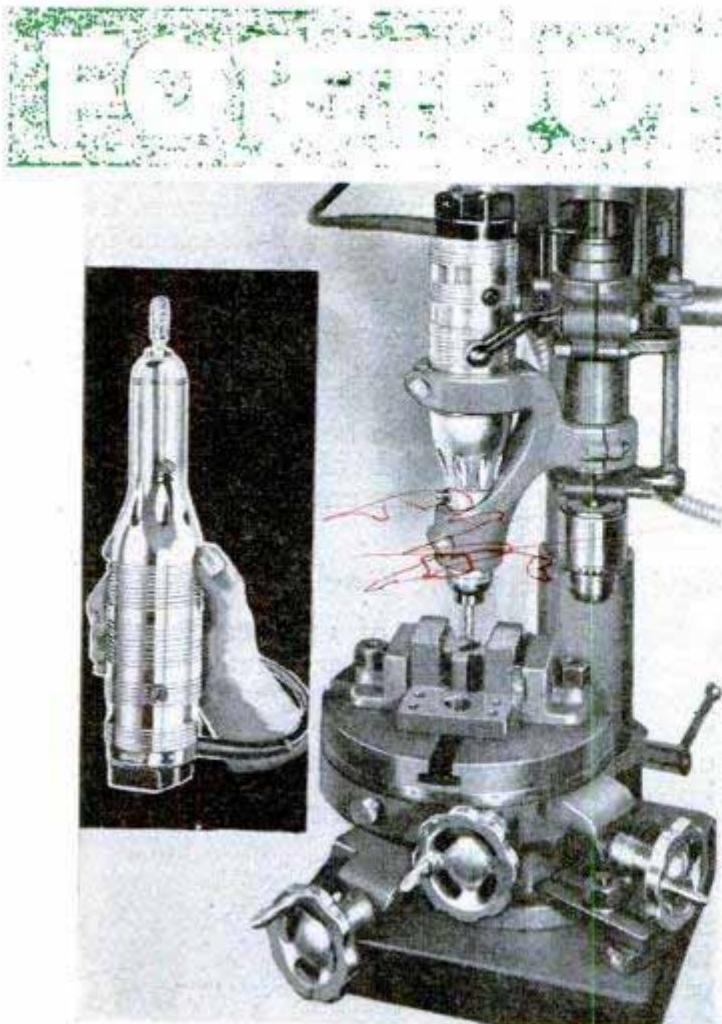
PLASTIC SAFETY WINDOW for metal lathe protects operator from hot flying chips, eliminating necessity of constantly wearing goggles. Transparent window is supported in a curved sheet-metal frame, the lower end of which is attached to bracket bolted to lathe



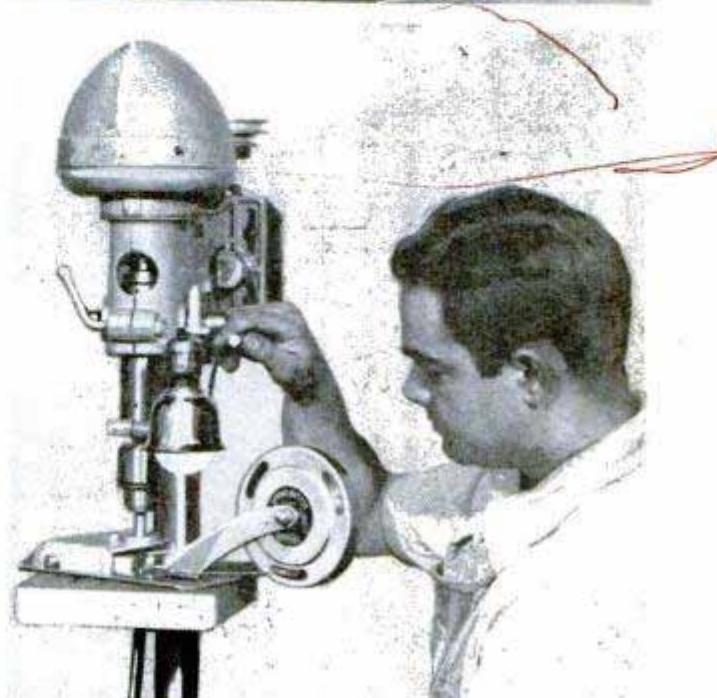
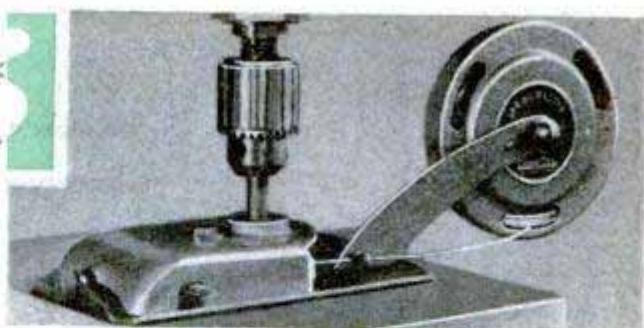
THREADLESS UNION designed for standard galvanized and black pipe is available in pipe sizes from $\frac{1}{2}$ to 1 $\frac{1}{2}$ in. It consists of a short sleeve, taper-reamed and threaded at each end for special sealing nuts, each of which contains a sealing ring of soft metal



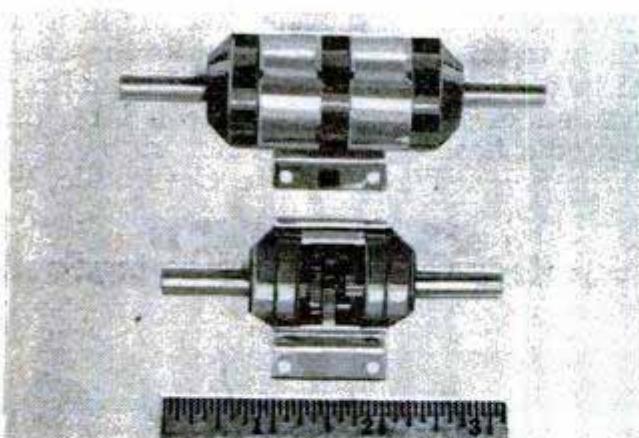
SEMIAUTOMATIC HACKSAW features an entirely new frameless design which enables the operator to make cuts of unlimited length in sheet metal or wood. In place of the conventional frame, a combination spring-loaded thrust plate and blade guide presses against the work as the stroke is made. The handle, to which the blade is attached, slides on a guide rod, thus steadyng the blade throughout the full stroke. Blade chuck takes standard hacksaw blades and also narrow blades for cutting wood. Wide thrust plate enables operator to do exceptionally accurate work



PRECISION GRINDER-MILLER was developed for super-accurate work in hardened steels at extremely high speeds. Uses special tungsten-carbide cutting tools, and can be mounted on drill press, lathe or milling machines on brackets attached to the arbors

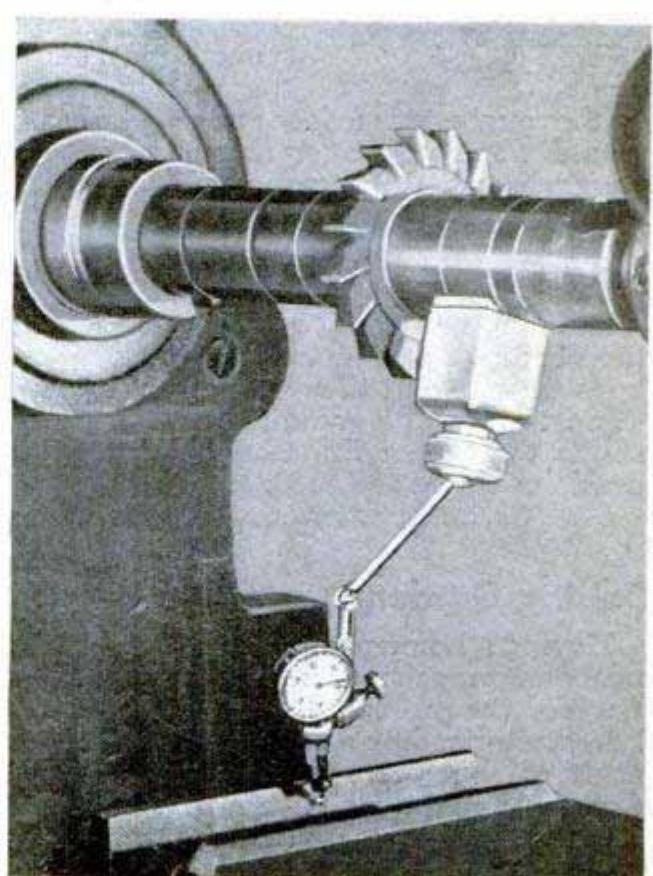


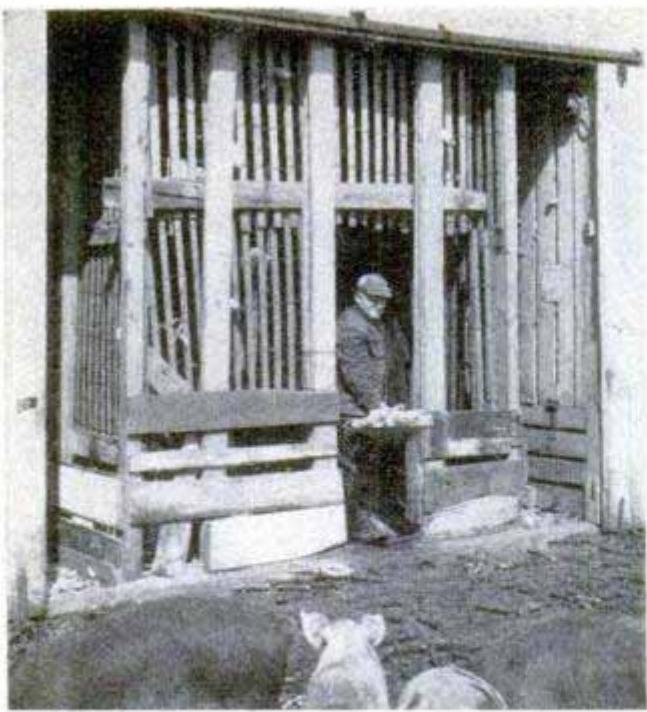
SPRING-WINDING ATTACHMENT for drill press makes springs in sizes from $3/16$ to $5/8$ in. outside diameter. Pitch of spring is varied by raising or lowering drill-press spindle. After free end of spring wire is started manually, machine works automatically



MINIATURE SPEED CHANGERS are available with hardened precision gears to provide more efficient power transmission and quieter operation at extremely high speeds. Supplied in single and multiple units with more than 500 ratios, these tiny speed changers are suitable for use in driving various instruments, controls and regulators of low power requirements

DIAL INDICATOR stays put wherever you place it on the machine or work, right, is supplied with a base housing a powerful magnet. The base holds firmly on a flat surface or round arbor and the indicator-dial unit is mounted on a universal arm having ball-and-socket joints that permit the indicator to be adjusted to any position for taking accurate readings





Reference Marks Penciled on Curve

By roughening the surface of a French curve, reference marks can be penciled directly on the curve for duplicating any particular segment of its edge when laying out symmetrical figures. With very fine sandpaper lightly roughen both sides of the curve, all the way around, for a distance $\frac{1}{2}$ in. in from the edge. Then, pencil marks can be readily drawn on the roughened surface and may be easily erased when no longer needed.

Frank M. Butrick, Jr., Alma, Mich.

Long Dividing Rail Mounted Over Trough Keeps Hogs From Wasting Feed

Running a dividing rail lengthwise over the center of a feed trough will keep out hogs and prevent them from wasting feed. The 2x4-in. rail is mounted several inches above the top of the trough on flat-iron brackets bolted to the sides.

Clyde Zimmerman, Topeka, Kans.

Raising Garden-Tractor Plow

Having a homemade garden tractor with no means for raising and lowering the plow, I solved the problem by using an automobile starter motor as a winch. I fitted the shaft of the starter motor with a small drum and ran a cable from the drum over a pulley to the plow attachment.

Charles Wesley Schutt, Alma, Mich.

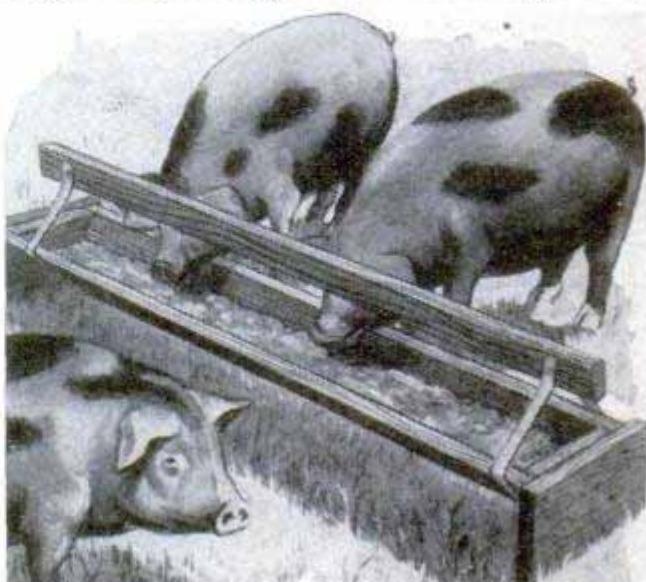
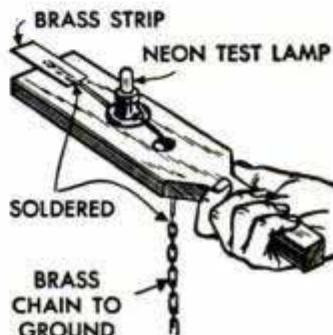
Temporary Corncrib in Driveway

Erecting a temporary crib of snow fencing in the driveway of a large double crib increased ear-corn storage capacity by nearly 2000 bushels. A frame of 2 x 6s is installed in the driveway to support the snow-fence walls, leaving a 2-ft. space for ventilation between the walls of the permanent and temporary corncribs along both sides of the driveway. To support the snow fencing at the lap, 2 x 6s are nailed to the uprights with scaffold nails, and to prevent spreading, the bottom of the crib is boarded up to a height of about 3 ft. along the sides and across the ends.

Tester for Electric Stock Fence

Normal operation of an electric stock fence can be quickly determined from any point in the field by this simple testing device. It is easily made from a 10-in. piece of dry wood with an ordinary neon testing bulb mounted in the center. One terminal of the bulb is soldered to a sheet-brass contact strip which projects from the end of the board, while the other terminal is soldered to a 24-in. length of brass chain that trails down through a hole in the board to form the ground. To test the circuit in the fence, allow the loose end of the brass chain to touch the ground while the brass strip contacts the fence wire. Normal operation of the fence is indicated by the periodic flashing of the neon bulb.

W. C. Wilhite, Carlinville, Ill.



TV AND ELECTRONICS FOR 1951

A—Speed-photo transceiver aids criminal investigators. Similar to wirephoto machines used by newspapers for sending and receiving pictures, it transmits and receives fingerprints, photographs suspected checks and other investigation matter long distances over the air in a few minutes. The instrument transmits and receives the pictorial material at the rate of one cross-section inch per minute

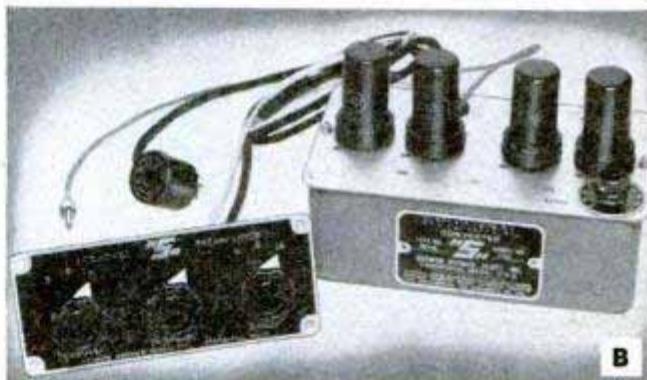
B—Converter suppresses record surface noises and turntable rumble without losing the high-frequency overtones responsible for natural musical brilliance. The unit shown has a built-in preamplifier for use with low-level magnetic pickups and it extends the useful life of records. There is a similar Dynaural noise-suppressing unit for crystal pickups without preamplifier

C—Electronic pointer enables a narrator or commentator to insert a black or white pointer about 30 lines high and seven lines wide at any point in a television picture, to describe more effectively the action taking place. The pointer is controlled by a device similar to the control stick of an airplane, providing an easy method of shifting the electronic pointer to follow the action. The rack-mounted chassis may be located anywhere a picture is available to the operator. A toggle switch selects either a black or a white pointer depending upon color of the background

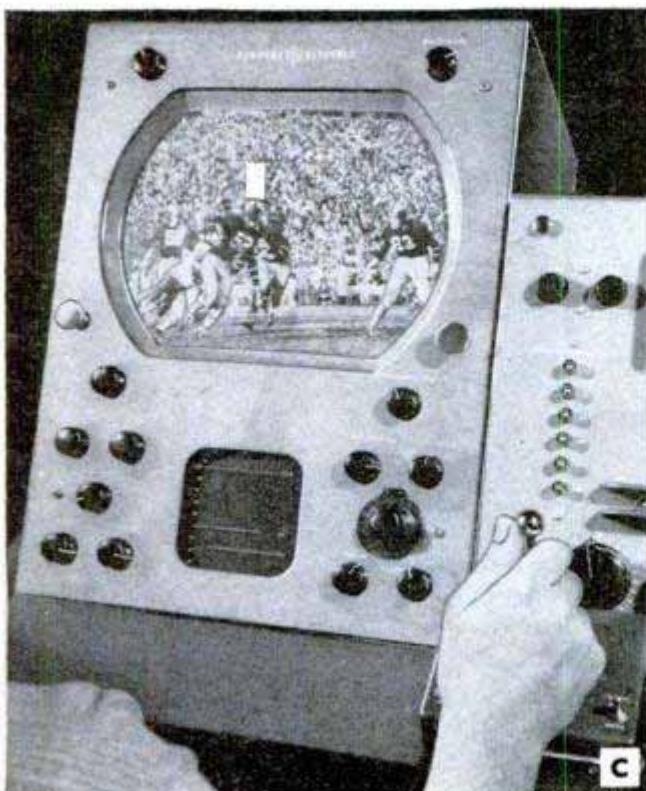
D—"Hideaway" indoor TV antenna disappears when not in use. It may be clamped to any TV cabinet



A



B



C

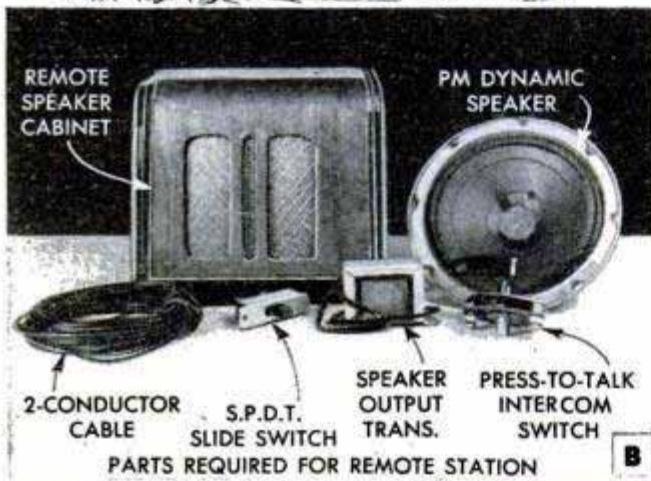


D

HOW TO USE YOUR RADIO AS AN



A



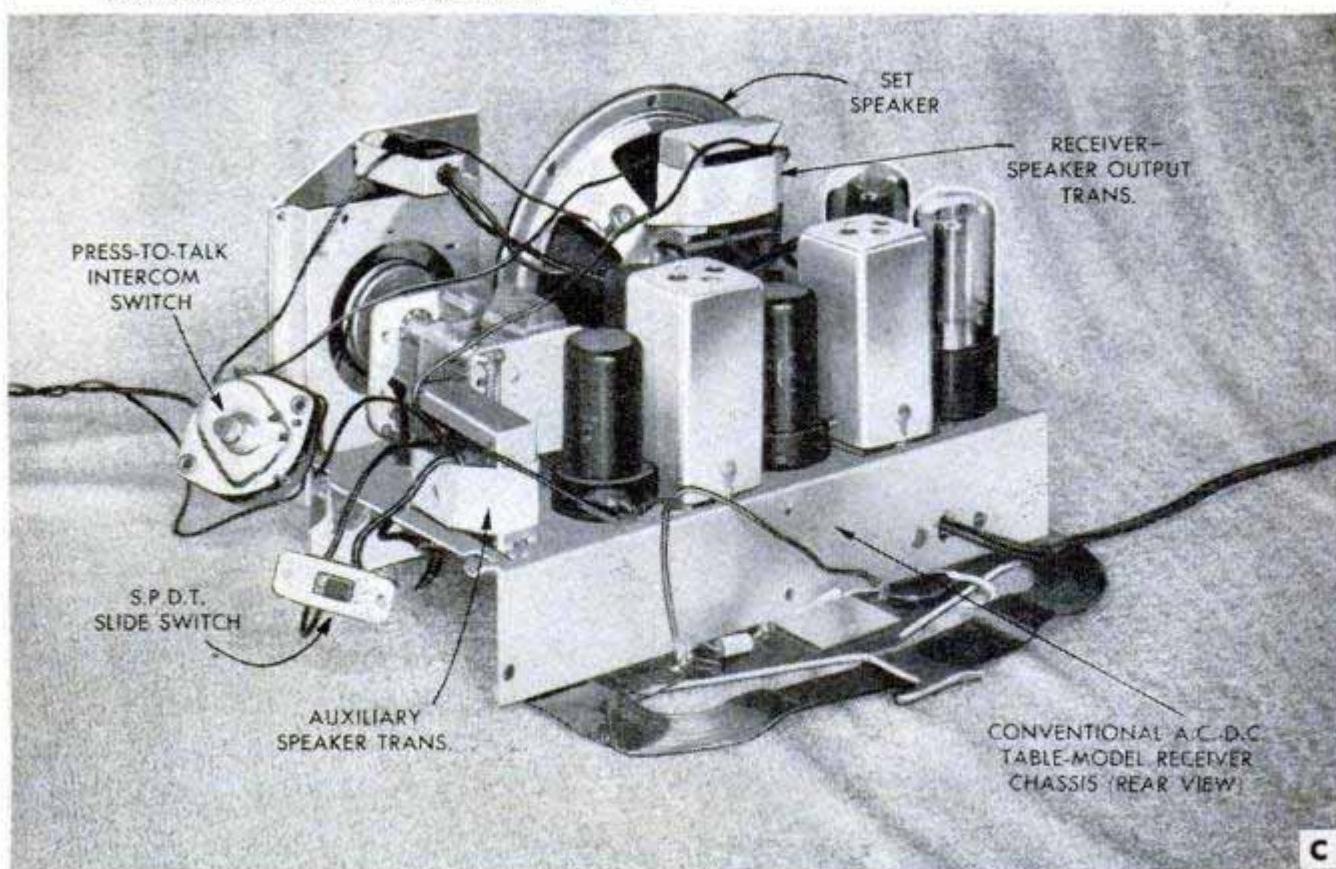
B

By M. Francis and Lee Wilcoxon

WHY NOT make your small a.c.-d.c. table-model superheterodyne receiver do double duty as an intercommunication system? With a few simple connections in the conventional audio section of the receiver and the addition of the parts shown in photo B, you can still enjoy your favorite radio programs and yet, at the flip of a switch, you can listen to the baby in the nursery, eavesdrop on callers at the front door, or keep a constant vigil over the children as they play in a remote part of the house. Press another button and you can carry on a two-way conversation with friend husband in the garage or in his basement workshop, as illustrated in sketch A.

All you need are a couple of switches, a small 4-in. PM dynamic speaker and an auxiliary speaker output transformer. The remote speaker cabinet shown in photo B is a simple intercom type available from most radio parts houses. Enough well-insulated 2-conductor wire to reach between the receiver and the remote speaker can be obtained at your local dime store. Ordinary rubber-covered 2-conductor lamp cord may be used. The system will operate well at distances up to 500 feet.

Before cutting holes in the receiver cabinet for the two switches, plan their locations carefully. Make certain that neither switch will interfere with receiver compo-

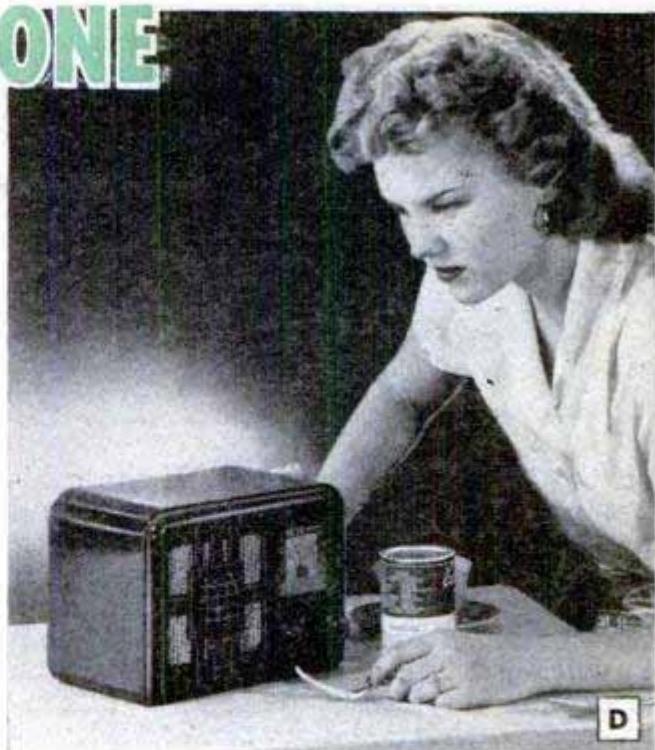


C

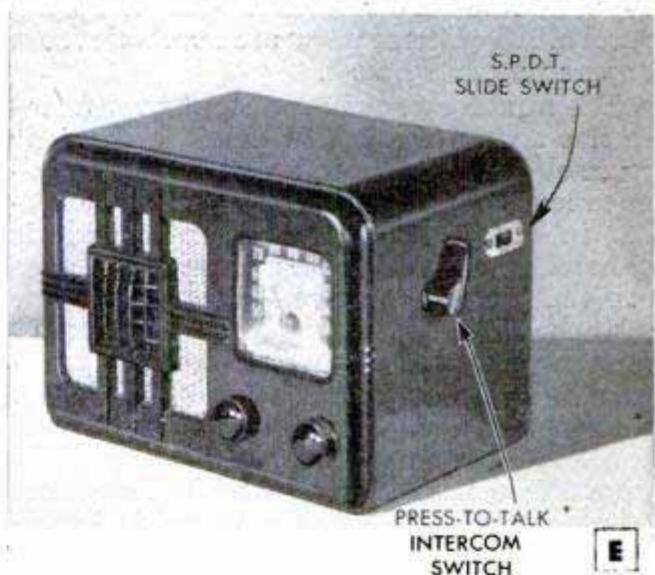
ONE

nents, or with each other. Electrically, the switch locations are not critical. Although the average a.c.-d.c. table-model receiver is very compact, there are usually a few cubic inches of space within the cabinet where the intercom switches can be mounted. In the completed model shown in photos C, E and F, these switches are shown mounted on the right side of the cabinet where they are most convenient for operation. Once completed, either the radio or the intercom system can be operated by a child.

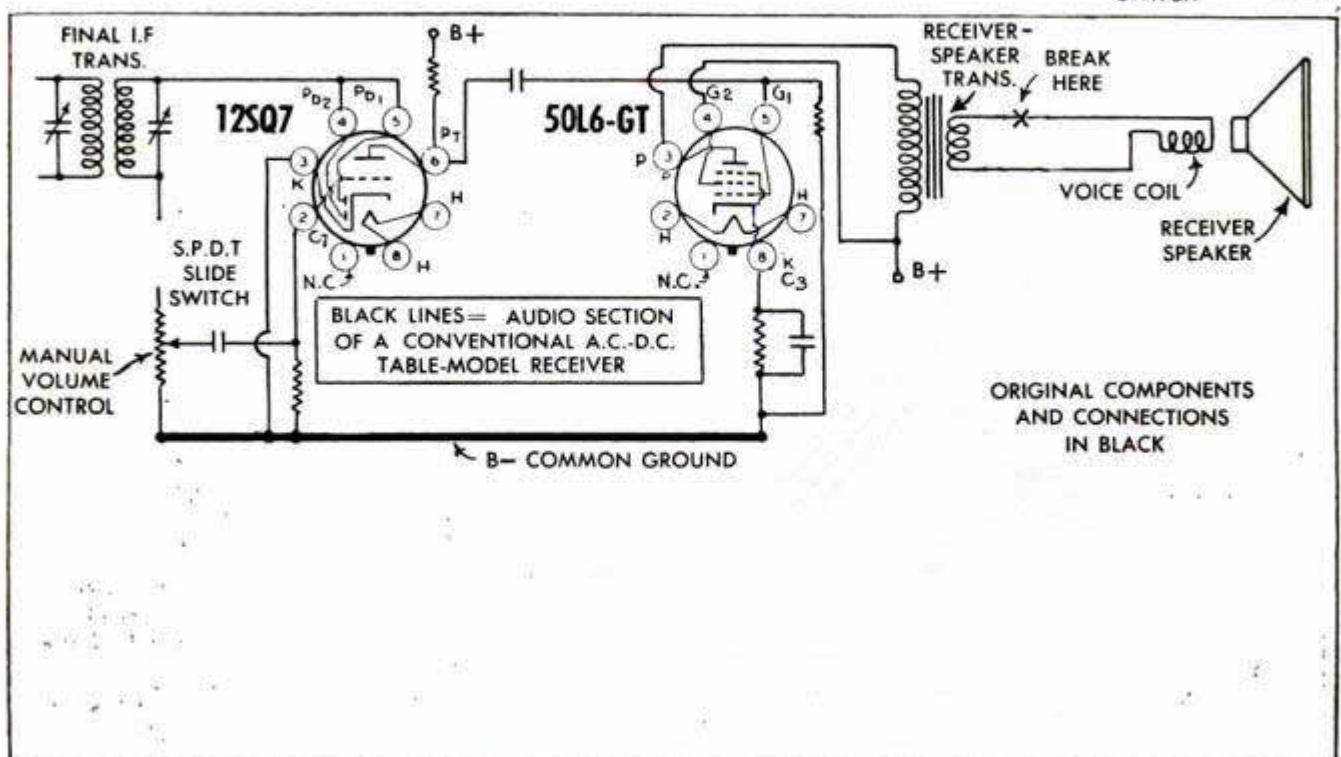
The typical a.c.-d.c. table-model receiver may be identified by the following tube complement: 12SA7, 12SK7, 12SQ7, 50L6, and 35Z5. Circuit diagram Fig. 1 shows the audio section of this very common standard circuit in black lines. No connections to the sockets of any of the tubes need be made; most of the wiring connections involve only the transformer windings and the manual volume control. All added components and wiring are shown in green. The first step, after the holes for the switches have been drilled in the cabinet, is to mount the auxiliary speaker transformer at a convenient spot on the chassis base, as shown in photos C and F. It may be mounted on the chassis with a few drops of solder after tinning the base at the place where it is to be mounted. It is not essential that this transformer be mounted on the chassis base for successful operation. Therefore, if there is not enough room for it on the chassis, use short wood screws and mount it at the nearest, most convenient point

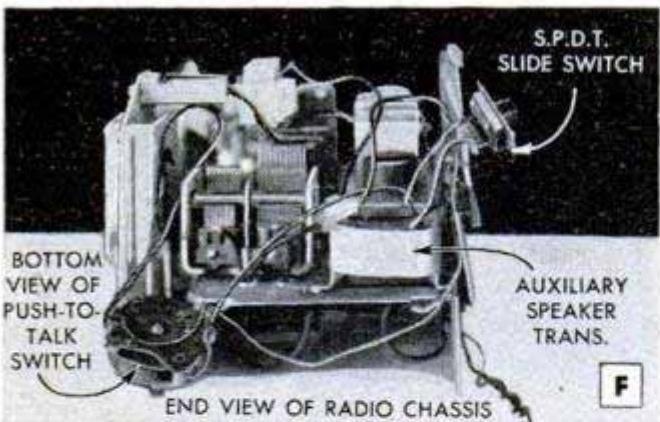


D



E





on the inside of the cabinet. If the cabinet is plastic, drill the mounting holes and use short 6-32 machine screws and hex nuts. The auxiliary speaker transformer can be a Thordarson type T22S45, or a Stancor No. A4744, which is a 2000-ohm to voice-coil type. The s.p.d.t. slide switch is a common type, but the press-to-talk intercom switch is a Mallory No. 7222L lever-type double-throw switch with a spring return. All of these parts are available from any radio parts house.

The auxiliary speaker output transformer has a pair of short leads either bare or enamel covered; these are the low-impedance leads that go to the small green winding in Fig. 1. The other pair of leads is generally cloth or rubber covered. These are the high-impedance leads. Solder one of these high-impedance leads to the common negative of the receiver. This point may be found at the negative side of the set filter condenser, or the cathode (pin 3) on the 12SQ7 tube socket. The other high-impedance lead of this auxiliary speaker transformer should be connected to terminal No. 1 on the intercom press-to-talk switch. Now locate the manual volume control in the receiver. In most all standard circuits of this type you will find a small mica fixed condenser connected across this manual volume control. This condenser is not shown in the black-line diagram but if there is one in your set do not remove it. Now take off the lead on the volume control that runs to the secondary of the final i.f. transformer but leave the connection to the small mica fixed condenser referred to. The other leads to the volume control are not disturbed. Connect the s.p.d.t. slide switch as indicated. Connect the center terminal to the volume control, and terminal R, on the switch, to the lead to the i.f. transformer. The other switch terminal, No. 1, goes to the high impedance (large winding) of the auxiliary speaker transformer as shown in green. The letter R on the slide switch indicates radio and the I stands for intercom.

The next step is to wire the press-to-talk switch into the circuit. Clip the set voice-

coil lead marked X in the black line diagram and make the new connections just as indicated with the green lines. When wiring in the push-to-talk switch be sure to solder short jumper wires as shown; these connect terminals Nos. 1 and 4 and terminals 3 and 6 on the switch. Follow the green-line connections carefully and you will have no difficulty whatever. Junction "Y" will be the common connection between the low-impedance windings of both transformers and both voice coils.

Additional remote speakers can be added to the system by connecting their voice coils in parallel with the voice coil of the first remote speaker, as shown in diagram Fig. 2. These speakers must be a reasonable distance from each other or from the master unit. All switching is done at the master unit (radio set). All of the speakers will be in operation at the same time unless the 4-point switch is added as shown. Because of impedance-matching problems it is suggested that the number of remote speakers be limited to three. By installing this third switch at the master station you have the advantage of separate two-way conversations, and there is no impedance-matching problem.

In some a.c.-d.c. receivers, the chassis may be "hot"—that is, it may be connected to the "hot" side of the power line. To avoid damage to equipment or danger of shock, always disconnect the radio set from the wall receptacle before handling the chassis. When making the final test, first replace the chassis in the cabinet, then apply power to the set and allow about 30 seconds for warm up. Throw the radio-intercom slide switch back and forth to determine which position is for radio and which for intercom. Tune in radio broadcasting stations to make certain the radio circuits have not been disturbed. Detailed student material list R-397 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage.

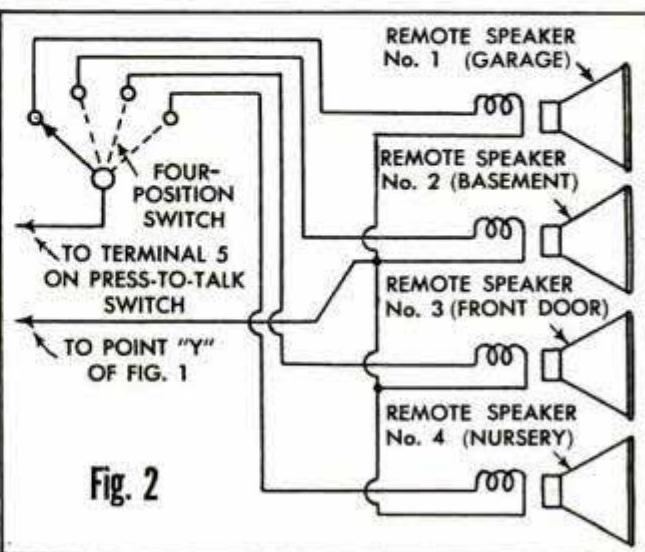


Fig. 2

Special-Purpose Phonograph Cabinets That You Can Build

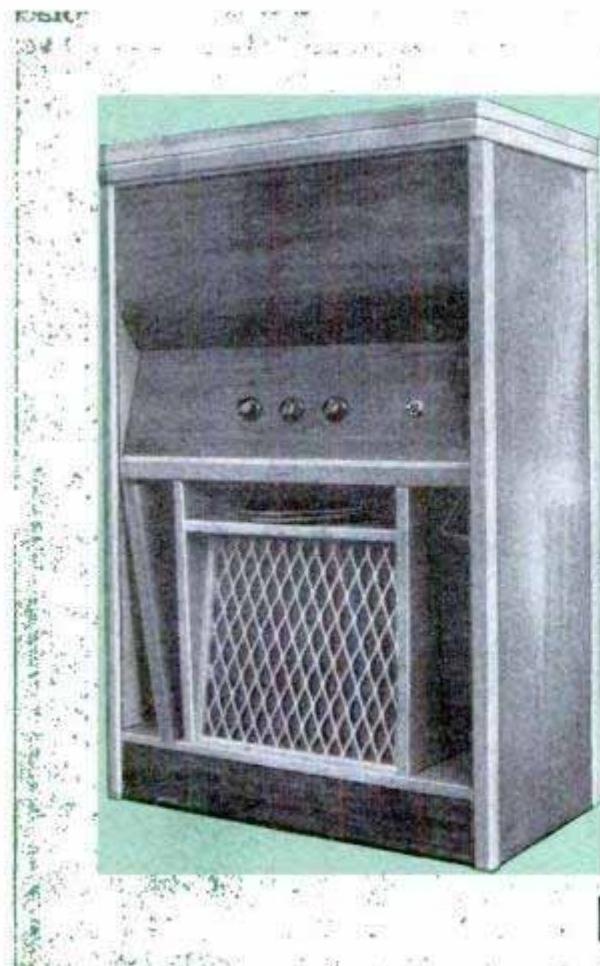
By Dr. R. C. Hitchcock

HERE ARE two phono cabinets that will meet the requirements of any music lover, or critical experimenter in high-quality recorded sound reproduction. The cabinet illustrated in photo A is designed for use with a separate loudspeaker; it houses the turntable and the amplifier and is placed some distance away from the loudspeaker enclosure, or exponential horn. As a matter of fact, it was built for use with the exponential horn that was described for construction in the August 1950 issue of this magazine. However, it may be used with any separate speaker cabinet, or bass reflex enclosure. With a separate installation of this type, the loud bass notes are far enough away to prevent microphonic action of amplifier tubes, and feedback vibration on the delicate pickup required for present-day electric-cut records is eliminated. Another view of this cabinet appears in photo C and the detailed construction sketch, Fig. 2, on the following page. This cabinet is 38 in. high, 22 in. wide and 17 $\frac{1}{4}$ in. deep; the height given includes the hinged lid. Bins are provided for various sizes of record albums.

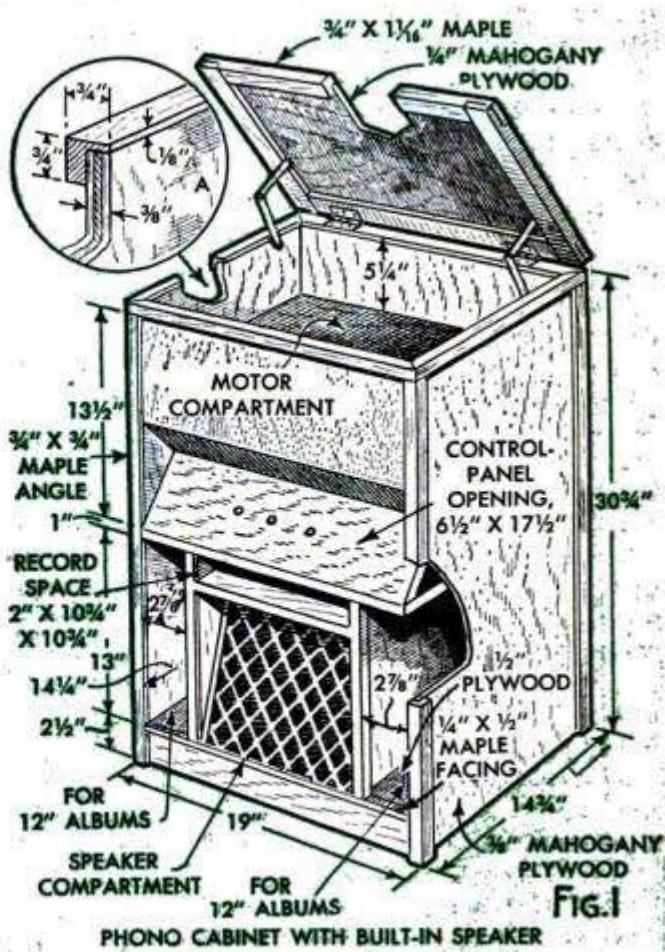
Cabinet B is slightly smaller and is designed for those who prefer to use an 8-in.



A



B



PHONO CABINET WITH BUILT-IN SPEAKER

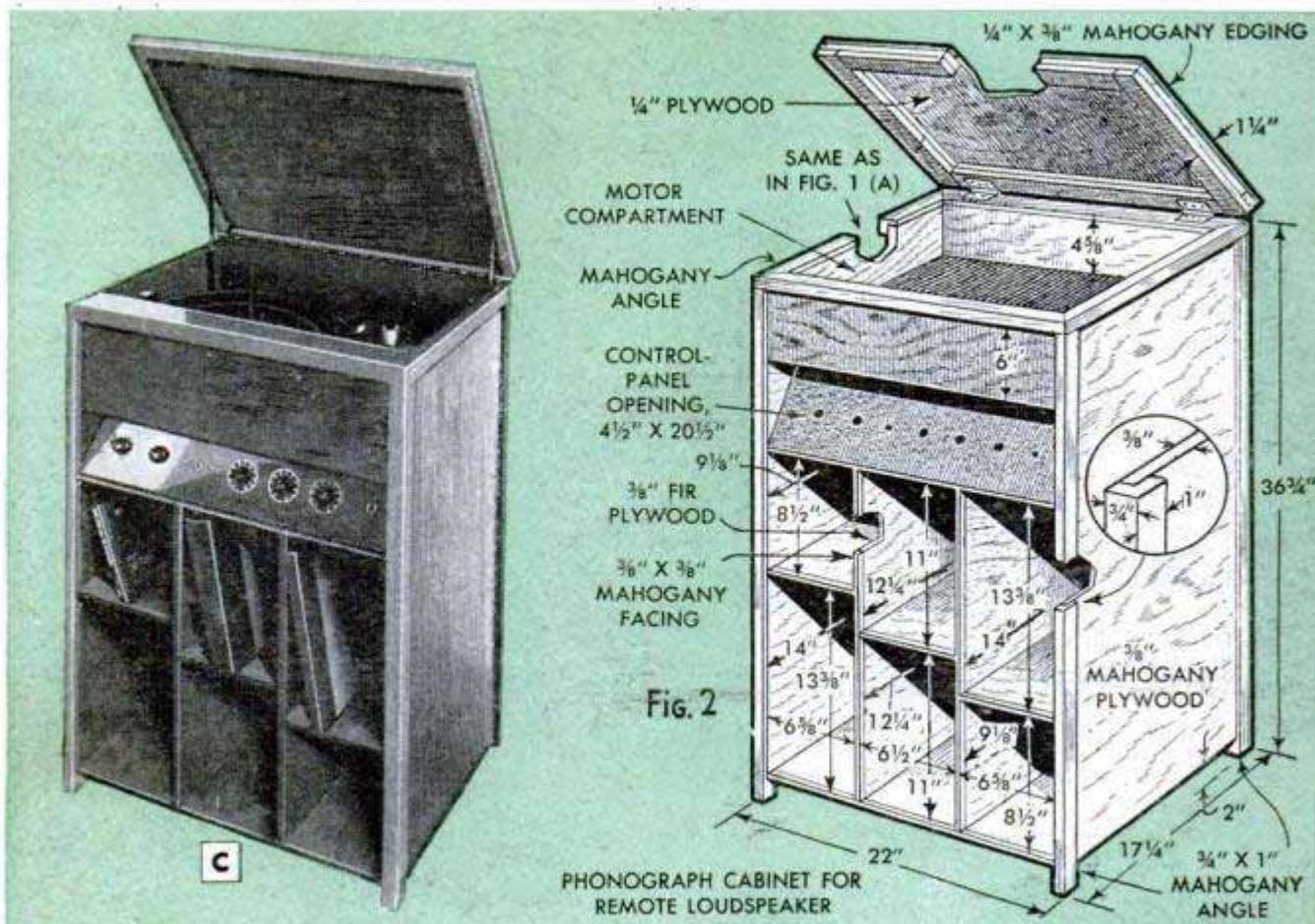
built-in PM speaker. Small bins on each side of the speaker take either 10 or 12-in. record albums. Above the speaker is a space for "loose" 10-in. records. The speaker panel is tilted to match the slope of the amplifier control panel. This slope in the speaker panel aids the hearing of treble notes which come from the speaker cone in a beam. All construction details are shown in Fig. 1. The case is made of $\frac{3}{8}$ -in. mahogany-faced plywood; the amplifier control panel and the center of the top are made of $\frac{1}{4}$ -in. mahogany-faced plywood. All of the plywood edges of this cabinet are covered with solid maple "angles." Other front edges are faced with $\frac{1}{4} \times \frac{1}{2}$ -in. maple. The usual grille cloth and brass openwork outer cover for the speaker grille are held in place with $\frac{1}{4} \times \frac{1}{4}$ -in. maple strips fastened with brads. Deep-red mahogany stain is used on the plywood sides, panel and top. This contrasts nicely with the natural blond color of the maple edges and facing as illustrated in the photo. The maple is finished with boiled linseed oil. The final finish for this cabinet, which is shown in photo B, is obtained with a clear varnish, rubbed down, and waxed.

The larger phono cabinet, photos A and C, detailed in Fig. 2, is also made of $\frac{3}{8}$ -in. mahogany-faced plywood bound with $\frac{3}{4} \times 1$ -in. mahogany angles as shown, and using $\frac{3}{8} \times \frac{3}{8}$ -in. mahogany facing for the storage bins. The amplifier space is 16 in. deep,

and the control-panel opening is $4\frac{1}{2} \times 20\frac{1}{2}$ -in. The inner partitions are $\frac{3}{8}$ -in. fir plywood, painted a deep blue. The turntable motor board is $\frac{1}{2}$ -in. fir plywood and this is also painted a deep blue. All mahogany is stained dark red, given a coat of clear varnish, and then rubbed down and waxed.

For ordinary amplifier controls only three knobs and identifying plates are required (volume, treble and bass) and a toggle switch with an on-off plate. There is plenty of room on the panel for other controls if they are required. Two record changers were installed in the large cabinet, photos A and C. One was a combination for the long-playing $33\frac{1}{3}$ -r.p.m. and the regular 78-r.p.m. records, and the other was for playing the small 45-r.p.m. records. The motor compartment is $4\frac{5}{8}$ in. deep and can be made deeper if necessary to house record changers of any type. Always check the dimensions of your equipment before starting construction.

The dimensions of these phono cabinets are not critical and can be easily changed by the builder to meet individual requirements. The record-album storage space can be modified in the one cabinet, photo C, to provide more depth room for any large amplifier or record changer. The other cabinet, photo B, may be used to house a radio-receiver chassis for a small phono-radio combination if the controls and dial can be shifted to the narrow control panel.





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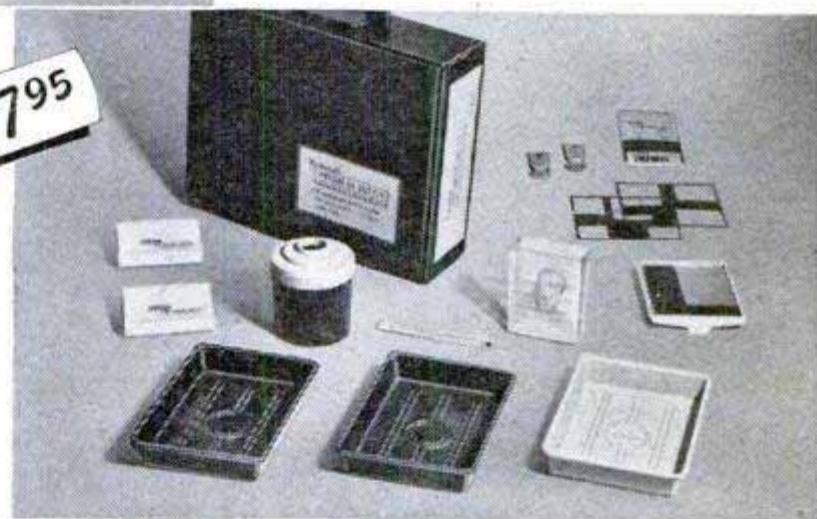


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ROGERS PALMER
Vice-President in
Charge of Sales

SNAP-ON TOOLS CORPORATION
8062-A 28th Ave., Kenosha, Wis.

I Rode the Airlift to the Orient

(Continued from page 102)

ships to flying ambulances, loaded, turned around and headed Stateside is a phenomenon of American ingenuity. It wasn't long before our convertible plane was being converted. After our brief layover in Honolulu, where I switched planes, and a quick midnight refueling stop at Wake, which allowed us time for a fried egg and coffee in a Quonset hut mess hall, we finally raised Tokyo over the morning horizon. It was Monday. We had left Fairfield Friday night. Some place between Wake and the green coast of Japan, there was a Sunday we lost forever. But the same international date line we crossed would give us two Tuesdays on the ride home.

Haneda airport is a continual bustle of activity, against a background of bomb-blasted factory framework left over from World War II. FEAF planes roar down the runways with litter cases from Korea. MATS planes roar in with cargo from the States. At tight intervals there are take-offs in both directions.

Fire engines race in behind every incoming plane with wounded, follow it down the runway and stand by while the litters are unloaded. No chances are taken with these boys.

Loading and unloading wounded GIs goes on around the clock. Those coming in from Kimpo or Wonsan are rushed to Tokyo General Hospital—collecting funnel for the air-evacuation job. They stay only long enough to get clean dressings. As soon as the medics think they're able to stand it, they're on the way.

Our "97" was cleared of its five tons of cargo and scrubbed down within an hour. Twenty minutes later, everything was ready for litters that would be brought aboard next day.

To expedite loading and unloading of the stretcher-borne GIs, MATS men have devised a host of unique equipment. At Haneda, there's a handmade ramp, hinged at the upper end. Hydraulic cylinders raise or lower the hinged section to meet the sill of any cargo hatch on any plane in the Pacific airlift fleet. For rainy days, there's a pallet with an awning over the top, which will hold three litters and can be raised bodily by a fork lift.

On some of the "air evac" planes like the big C-74, no ramp or lift is needed. This plane has its own elevator—a self-contained chunk of its belly, about 10 feet wide and 13 feet long. It is suspended by cables, at each corner, which are reeled in on a hydraulic lift. It will take three litters

(Continued to page 242)

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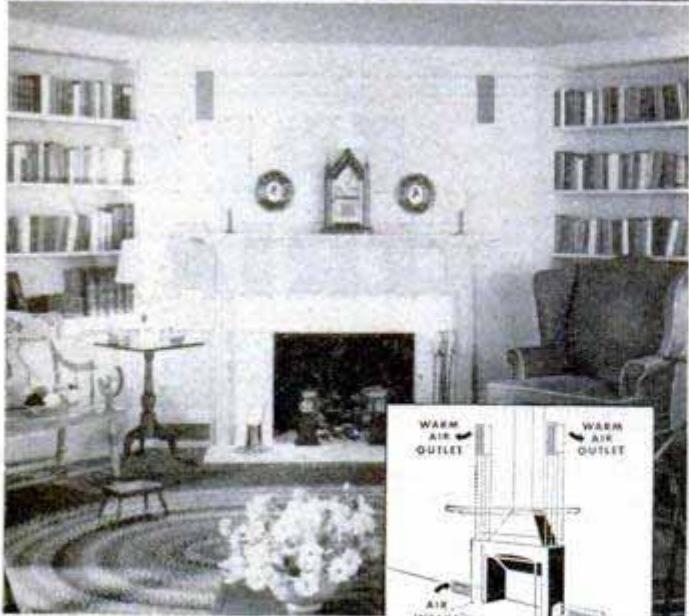
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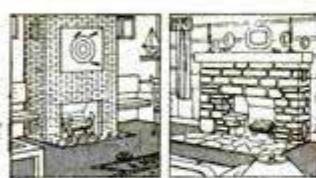
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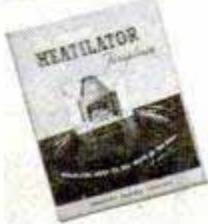
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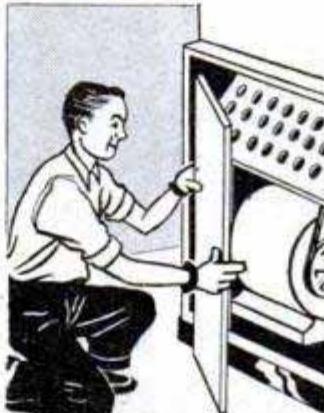


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Furnace-Fan Speed

Q—The blower on my new warm-air furnace has a V-belt drive and the 3-in. motor pulley is of the variable-speed type. The fan pulley is 8 in. in diameter. The fan runs quite fast and is unusually noisy. I'd like to reduce the speed and the noise by putting a larger pulley on the fan shaft. Is this advisable? — R. M. Springfield, Ohio.

A—It is not clear from your letter, in which you describe the furnace fan as "noisy," whether you are referring merely to the rush of air through the furnace and ducts, or whether you mean that noise has developed as a result of a mechanical fault. If the latter is the case, then it would be a good idea to remove the back of the cold-air chamber and examine the fan unit carefully. On most units of this type both the fan and motor are rubber-mounted. If either the motor or the fan is loose on its mountings, this would be a possible source of objectionable noise. If the rubber in the mountings has deteriorated to the point where it has lost its resiliency, it will no longer be fully effective as a noise damper. In this case it will be necessary to renew all the mountings. Other possible sources of objectionable noises are, vibration of the sheet metal in the plenum chambers and ducts due to variable air pressures while the fan is in operation, cold-air registers partially covered with rugs or other objects, loose ducts, and metal-to-metal contact between the fan and furnace housings. You can change the pulleys as you suggest, but we are doubtful that this alone will eliminate the noise. Also, the installation of a larger pulley may lengthen the fan cycle. We would not recommend that you change the pulley sizes, but if you wish, you can write direct to the manufacturer of your furnace and get his recommendations.

Removing Corrosion From Brass

Q—How can I remove corrosion—the greenish coating—from a brass doorknob and other exposed parts of the door lock? Ordinary polishing does not seem to remove the coating and discoloration.

W. S., Manchester, N.H.

A—Because of your reference to a "greenish coating," we are assuming you mean a solid brass lock

(Continued to page 238)



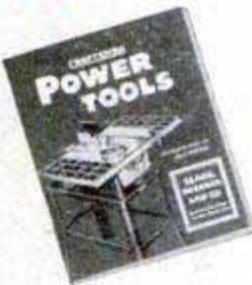
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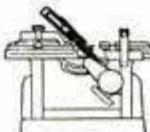
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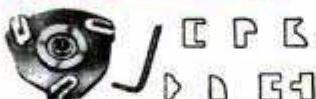
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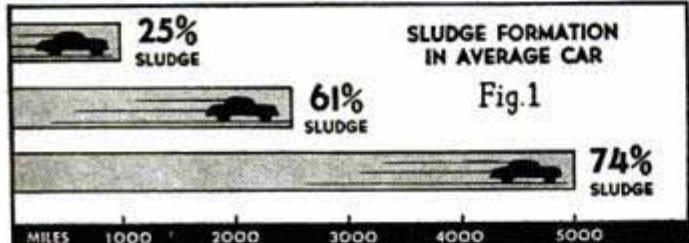


Care and Feeding of Engines

BY S. P. CORP

HOW OFTEN TO CHANGE OIL?

Within the past year there have been many conflicting recommendations on how often to change oil. One magazine article suggested that every 4000 miles is often enough under normal conditions. The point most often missed is that the average car owner does most of his driving between home and work. The engine does not have time to warm up enough. Sludge forms.



This sludge is potentially dangerous to your engine, no matter how efficient your oil filter. The best insurance against such danger is to change oil every 1000 miles.

WHAT ABOUT TIRE PRESSURE?

Many drivers are confused by conflicting advice on the new low-pressure tires. If you were told to keep this pressure at 24 pounds, remember that that means 24 pounds in a cold tire. A tire with a cold pressure of 24 pounds may have 29 pounds when hot. If you have tires checked while hot, and have the 29 pounds pressure reduced to 24, you will be running on under-inflated tires, and will notice rapid tire wear or uneven wear. If you have your low-pressure tires inflated while hot, inflate them to 29 pounds. They will have only 24 pounds when they cool off.

SWITCH TIRES FREQUENTLY

Due to different kind of wear on front and rear, it is important to switch low-pressure tires frequently, following the method indicated in Fig. 2.

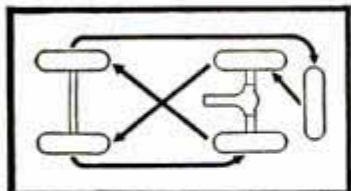


FIG. 2

WATCH FOR EXHAUST SMOKE

If you buy a used car, or if your new car has gone more than 20,000 miles, watch for exhaust smoke—an indication that you need new Sealed Power Piston Rings. There is a set of Sealed Power Rings specifically engineered to do the best possible job in your engine, whatever the make, model, or engine condition. No other ring equals the Sealed Power MD-50 Steel Oil Ring for oil control, even in badly tapered and out-of-round cylinders. To save oil, save gas, and restore engine power, get new Sealed Power Piston Rings when your exhaust smokes!

(Continued from page 236)

and not one with brass-plated parts. Probably the best method of renewing the parts of the lock is to apply a specially prepared chemical for removing verdigris from brass. To do this it will be necessary to remove the lock from the door so that the parts can be treated individually. In applying the chemical to the parts of the lock it is important to follow the instructions on the container in every detail. After the coating and discoloration have been removed, the parts should either be polished on a buffing wheel or by hand with a cloth pad charged with polishing rouge. All polished parts should then be coated with a clear metal lacquer to retain the bright finish and protect the metal from corrosion.



Patching Wallboard

Q—I wish to move a double baseboard electrical outlet from one location to another on a wall which is of softboard coated with a texture paint. The problem is how to patch the opening after removing the outlet box. Can you suggest a method that will result in a smooth and permanent job? F. B., Cairo, Ill.

A—One method quite commonly used where the edges of the opening are smooth and unbroken is to cut a rectangular piece from white pine measuring about 1 in. larger each way than the overall size of the opening. Drill a hole through the center of the piece large enough to admit the middle finger. Inserting the middle finger through the hole enables you to hold the piece in place while it is fastened with screws or nails driven through the wallboard and into the wood. Drive the screws or nails in far enough to sink the heads well below the surface of the wallboard. Then cut and fit a matching piece of wallboard in the recess and nail or screw it in place on the wooden backing. Fill all of the nail holes and joints with water putty. Now, apply a texture paint of the same color as that on the wall and stipple it to match the surrounding surface. It is important that white pine, as mentioned above or other softwood be used for the backing board. If a hardwood should be used, it is doubtful that you would be able to hold it in place with the finger while driving the nails or screws through the wallboard.



Open Floor Joint

Q—A few months ago I laid two 6-ft. strips of linoleum side by side in my kitchen. Now the joint between the strips has opened nearly $\frac{1}{8}$ in. all the way across the room. I filled the joint with a crack filler (water putty), but the filler has loosened and broken out. How can I fill the crack permanently? — J. T., Salem, Ore.

A—While no ordinary crack filler can be considered permanent, one fairly effective solution to your problem is to dissolve thin linoleum shavings in clear brushing lacquer to make a creamy paste, or putty. Force this into the crack and smooth it quickly with a putty knife, or better still, the polished head of a hammer. Be careful not to spread the material on the linoleum as it will soften the surface. After the putty has set, go over the joint lightly with steel wool or fine sandpaper and then wax the entire floor. In preparing the putty, use shavings from the same linoleum as that on the floor, if possible. If you have a gas stove in your kitchen, put out the pilot lights and open doors and windows before mixing and spreading the putty so the lacquer fumes will be dispersed.

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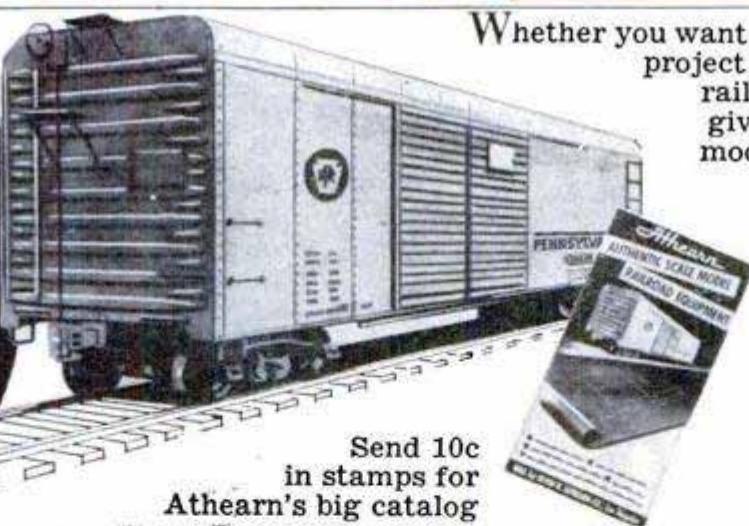
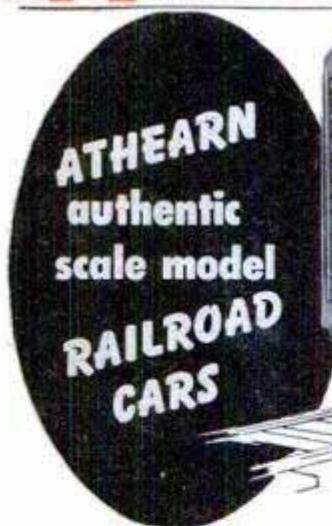
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New Trees From Old

(Continued from page 85)

have received their vitamin shots and are in good commercial production.

Vitamins and hormones often have the effect, too, of driving bark-boring insects and other pests out of a tree. An infested tree is sometimes entirely free of insects three months after a treatment. Apparently such striking results occur because the pests usually attack trees that are in poor health. When a tree is restored to health, it seems to drive the insects away.

A very weak solution of indole acetic acid and water can be used, as irrigation water for a tree that is in poor shape but faster and more positive results are had when the substance is injected directly into the trunk. For this purpose, a gelatin capsule containing the hormone material is inserted in a hole that is bored into the sapwood, the hole is closed with a cork that has been smeared with vitamin paste, and sterile water is then injected past the cork and into the hole by means of a veterinary's hypodermic syringe. The water dissolves the capsule and allows the tree to absorb the hormones. New feeder roots begin to grow within a month or so of this treatment, and one capsule is regarded as sufficient for the life of the tree.

Experiments are being conducted with a new glass ampoule containing the hormone material plus a quantity of neutral gas under pressure, to simplify the injection operation. The tip of the ampoule is protected by a short rubber tube, at the end of which a hollow needle is attached. The needle is forced through the bark of a tree, into the sapwood, and the rubber tube is then twisted to break off the neck of the ampoule. The enclosed gas then forces the hormone solution through the tube and needle and into the tree's tissues. Not yet on the market, the ampoule will eliminate the need of boring a hole into a tree.

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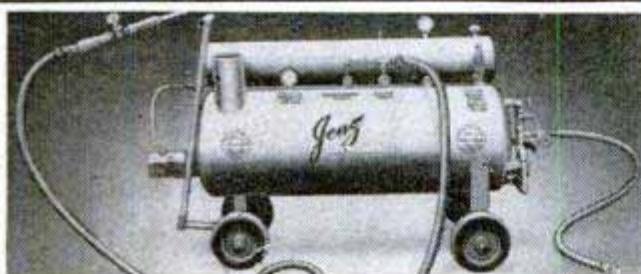
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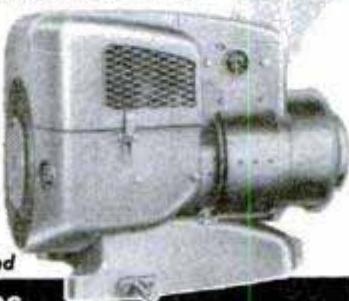
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at a time. To make it more efficient, Lt. Robert Aldea, an airlift pilot, has just invented a rack which he made of scrap iron pipe. With this, loading and unloading of wounded on the C-74 will be speeded, for it fits on the plane's elevator and nine litters can be slung on it at once.

An hour before flight time next day, ambulances made from converted bakery trucks with racks inside to hold nine litters in tiers, rolled in from Tokyo General and backed up to our plane. Stretcher bearers marched single file up the ramp in a steady stream with their burdens.

Litters were rigged inside the plane with swift efficiency: men with contagious diseases went up front, those with jutting casts were grouped so the cast was on the aisle side. Heavy men got the lower berths. Each litter was hooked in place by a crew of riggers as it came aboard. On each side, five rows of litters were stacked four high. Permanent wall brackets secured the inside handles. Outside handles were clipped to heavy webbed straps that hung from the overhead, and fastened to the deck at the bottom. Down the center there was room for another row of litters, five high. "The top man's nose practically scrapes the control cables," the nurse announced. "But he never seems to mind. He's going home." Handles on one side of the center litters are clamped to rigid stanchions that hinge down from overhead sockets and fasten to the deck. Handles on the other side are secured by straps that anchor into the overhead and the deck. We could take 60 patients topside (but don't), 23 more on the lower deck, and a few more could be squeezed into the tail if necessary.

I learned from our new skipper, Capt. Dave Hill, that we'd have 37 casualties, two nurses and two medical attendants aboard to start. We'd pick up 27 more wounded, another nurse and attendant at Midway, where they'd been marooned the day before when their plane developed engine trouble.

Medical and rest facilities for 80 men and three women aren't lavish on a stripped-down airfreighter. But MATS men have invented prefabricated units to solve most problems. Nurses warm soup for their patients on an electric galley unit of stainless steel, with cooking burners, storage closets and shelves for water and coffee jugs. It is hauled aboard on the lift and tucked in a corner up front. Medical attendants open trunklike kits that become miniature drugstores, with everything from hypodermics to fresh dressings.

The most unique innovation of all came rumbling across the apron on a dolly

(Continued to page 244)

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pushed by one man just before take-off—an aluminum washroom pod, partitioned into two separate rooms. It was hoisted up through the bay doors on the lift, lashed to the overhead, and the doors closed up under it. "We never worry about being late for take-off anymore," Captain Hill grinned. "When we see the pod rolling out the apron, it's time to go. It's the last thing on and the first off, since it sits over the doors and nothing can move in or out the hatch while it's in place. It's handier than a built-in washroom, because it can be taken out and sterilized at each stop. The sterile one from the previous plane replaces the one we drop off."

A few minutes later we were off for the States. Japan's hilly coast faded away behind us and we thrummed into the dusk at 17,000 feet. In the litter ward, the nurses walked quickly up and down the narrow aisles between the litters, the faint glow of their flashlights seeking out faces of men calling softly to be turned over, or given something to relieve pain. Up front, on two double canvas chairs, attendants had their "drugstore" operating in full swing. Rows of sterile hypodermics gleamed on white gauze, rows of vials stood in racks on the lids of the kits.

Captain Hill often invites ambulatory patients to visit the control cabin, which they love to do. When the place gets too crowded, they must be chased out. One MATS navigator has a neat trick for breaking up the party. "Know where we are?" he asks the gang peering over his shoulder. Naturally, they reply with a curious "No."

"Well, neither do I," says the navigator. "Why don't you fellas go back inside so I can get to work and find out." It works.

The tropical sun was high when we hit Midway—coral island two thirds of the way to Honolulu. We let down to refuel and give our patients a hot meal. Midway has a special hazard—gooney birds. "The only birds in the world so stupid that they try to land downwind," says Captain Hill. "As a result they're always tumbling in on landing and breaking their wings and legs."

The landing strip below was littered with the chicken-sized creatures. They fly at the big planes coming in, foul up in the propellers and generally snafu the works. One pilot had one come through the windshield and land in his lap—a nerve shattering experience when the wheels of your 74-ton plane are six inches off the strip.

At Midway, we picked up the rest of our patients and headed for Honolulu, where bakery-truck ambulances met the plane. Swiftly, the wounded GIs were unloaded and wheeled off to the brand-new Tripler

(Continued to page 246)

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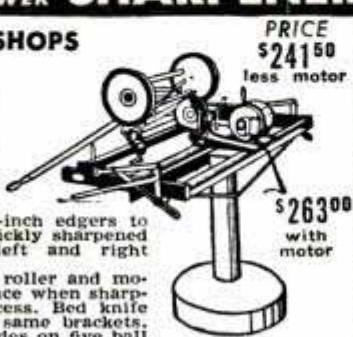
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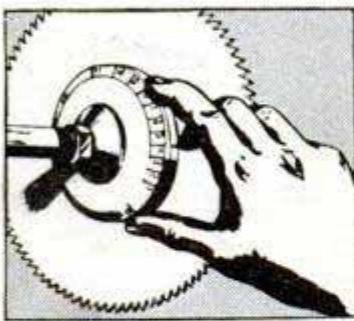
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Hospital where they would rest for a day or two, get fresh dressings on their wounds and proceed to San Francisco. Twelve hours later, our "97" picked up a full load of litter patients that had come in two days before on another plane, and roared over Diamond Head on the long haul toward Fairfield-Suisun.

It was an exceptionally clear night as we let down over the Golden Gate. San Francisco glittered like a huge diamond-studded gem against the black Pacific. There were murmurs of satisfaction among those patients lucky enough to be near windows. In another few days, after a medical check-up, they would board a MATS Continental air ambulance and fly the last leg of their journey to the big military hospital nearest their home town.

As I went back to strap myself in for the landing, one redhead GI, with a leg in a big jutting plaster cast, looked up with a grin from the port his nose had been pushed against. "Sure is worth fighting for," was all he said.

I'm Building the Popular Mechanics Plywood Ranch House

(Continued from page 89)

first running a shallow saw cut or kerf on the outer side of the 2 by 6s. Then a window is slid into its opening and strips of metal flashing are slipped into the groove and nailed to the plywood wall sheathing. When the finish siding is placed over this flashing, no matter if your lumber does shrink or warp over the years, the joint will remain watertight.

Especially nice from the wife's viewpoint is that these modern windows are in effect trim box windows—the glass being on the outside edge, giving a wide usable ledge on the inside and no ledge on the outside of the house to collect dust and grime.

Especially good for you who build them is the fact that these door and window frames are very easy to rip out yourself on a power saw. Honestly! And so are the louvers that go beneath the large fixed panes. Louvers at one time were a difficult cabinet job; now they have been simplified and designed to completely eliminate the difficulty of obtaining a weathertight fit of the louver door.

For the larger windows of the Ranch House, crystal glass was specified. As this amateur can break a pane just looking at it, I had expert glaziers install the glass. You can do this, or can measure your window frames after they are made and order to size. Or you can cut your own. Here is

(Continued to page 248)

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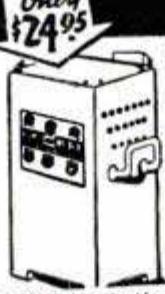
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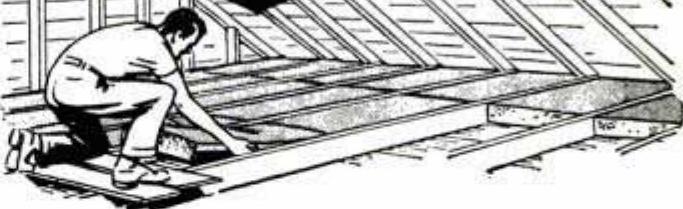
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Handy assortment of 10 popular sizes of SPEED NUTS and matching screws. Over 100 home repair and hobbycraft uses. Once on—they stay on! Replace threaded nuts and lock washers.

ONLY \$1.00
POSTAGE INCLUDED
SEND CASH OR
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TINNERMAN PRODUCTS, INC.
DEPARTMENT 13 • CLEVELAND 1, OHIO

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ON WINTER FUEL
BILLS!**

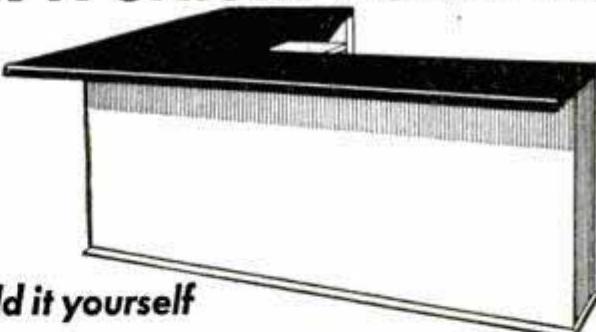


Want to chop \$25—\$50 off your heating bills this winter, and enjoy greater comfort at the same time? Then insulate your attic or top floor ceiling with new fireproof Gold Bond Rock Wool Insulation. A cinch to install. Comes in 2' or 4' Enclosed Batts and new 8' Sealed Blankets, in standard widths that fit snugly between attic floor joists or roof rafters. Completely enclosed for easy handling with Vapor Barrier on face side. Keeps furnace heat in and summer heat out. Get Gold Bond Enclosed Batts or Sealed Blankets from your dealer today. And for best results be sure to order them "full-thick"! Free descriptive booklet sent on request. Write Div. Y, Dept. PM-1

Available at your local Gold Bond lumber and building materials dealer

NATIONAL GYPSUM COMPANY
BUFFALO 2, NEW YORK

WANT A BAR... OR A SNACK COUNTER?



Build it yourself

WITH THE FAMOUS EASI-BILD PATTERNS

25¢ brings you FULL-SIZE PATTERNS of this modern bar. You can build it to stand-up or stool height at a big saving...when you do it yourself.

Send an additional 20¢ for the Easi-Bild* Pattern Book, showing the entire Easi-Bild line. You'll see at a glance how you can save important money around your home.

*T.M. Easi-Bild Pattern Co.

**UNITED STATES
PLYWOOD CORPORATION**

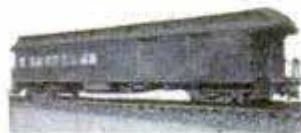
Dept. PM, P.O. Box 215, Pleasantville, N.Y.

AMBROID**The Universal
Liquid Cement****NEW CAR KITS**

Preformed basswood, precision-machined, HO gauge, no paper parts, hardware furnished. 2 oz. 25c tube of Ambroid included.

**Open Platform Passenger Coach**

Wooden sides, cut out windows. Complete metal parts for under-body truss rod system.

\$3.65 less trucks

Combination Baggage Car and Coach
to match above. 2 operating doors on each side.

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AMBROID CO.

Established 1910

303 FRANKLIN ST., BOSTON 10, MASS.

A complete shop in one precision machine!

The IDEAL LAWNMOWER SHARPENER

- sharpens hand and power mowers
- completely new—based on 48 years of lawnmower sharpener experience
- complete with bed knife grinder and lapping-in Re-conditioner—all operated by same motor

You can do precision lawnmower sharpening faster and easier than ever before on the Model 300 Ideal Sharpener. No disassembling needed, place the entire mower in the machine. You can make more money and do better work with an Ideal. Get all the facts, compare, no other sharpener offers as much as the Model 300 Ideal.

Write Today For Free Catalog

THE FATE-ROOT-HEATH COMPANY
DEPT. H-3, PLYMOUTH, OHIO

how the experts do it today. One man holds a pane snug against its window frame while a second man runs an ordinary glass cutter freehand down one side and across the top, using the frame underneath as a guide line to trim the excess glass. He then taps the glass with his cutter to crack it and snaps off the excess with his hands. This way has the advantage of no mistakes in measuring or fitting.

The windows of the Ranch House are definitely inexpensive, whether you have the glass installed or not! Actually, at today's prices, any area of the exterior wall of a house enclosed with this modern type of window costs less than the same area closed off with any standard solid wall. Therefore, you can have large window expanses, yet economize!

If you live in a very cold climate, the advantages of the ample window expanse in the Ranch House need not be lost. You can double-pane with the crystal glass—the modern frames are designed for that. Or you can use the more expensive thermal type of glass.

If the A-Bombs Burst—

(Continued from page 137)

About 67 percent of the nation's population live in these industrial and metropolitan communities.

The Manhattan stenographer, the Chicago Loop executive, the steel-mill worker—all are potential victims. They have a vital stake in civil defense. And as they become familiar with the destructive pattern of the bomb, some important questions pop into their minds. Information from the AEC and the Civil Defense Office contains the answers:

Q. All these facts and figures are from the Hiroshima-type bomb. I read somewhere that bombs are being made bigger. Couldn't a bigger bomb destroy all of New York, or Chicago?

A. Suppose that the already unbelievable power of the bomb were doubled. This would increase the radius of serious danger by only one fourth—from 2 to 2½ miles. Thus, for protection from more powerful bombs, you must be slightly farther away or slightly better shielded in order to survive.

Q. You keep talking about an air burst. Why figure on that? Can't somebody drop a bomb on the ground or in the harbor off New York or Seattle and "contaminate" an area right up to my doorstep?

A. It's just simple mathematics that an air burst, in most cases, will cause the

(Continued to page 252)

KING MIDGET Home Assembled Auto

WORLD'S LOWEST PRICED CAR!

Drive this car for as low as 50c per week. Precision built parts direct from factory with beautiful all steel body. Get the facts on this amazing small auto—send 25¢ for detailed circular with large picture, 3 view drawings and price of all parts, or send \$1 (refunded first order) for this plus actual assembly book with 42 photos, drawings; blueprints of snow, ice conversions. Ideal for micro-midget racing — Get this information.

MIDGET MOTORS MFG. CO.
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1951 BUZZ MASTER

8 MODELS — \$99 up



More cutting—"Tomorrow's BUZZ MASTER Today!" See the de luxe riding model. Nothing else like it. Made by the oldest firm in the business—now in our 47th year. Many special features used only on Ottawa Saws. Write today for FREE DETAILS. OTTAWA MFG. CO., 1-127 Brush Ave., OTTAWA, KANS.

Keep Fords all Ford with Genuine Ford Parts

Made Right, to Fit Right to Last Longer



NOW! A MIDGET PLANE EASY TO GRIP

Pat. extension handle makes it as easy to Grip as a big one. Handy for small spots and all around fitting and finishing. 3 1/4" x 1 1/4" face. Precision made. Blade guaranteed to hold edge.

Cash with order Prepaid (C.O.D. Postage extra). Order today. Only \$1.50.

Another Speedcor Tool

THE SPEED CORP., PM-1
512 N.E. 73rd Ave., Portland 16, Oregon



BATTERIES!—START

—a factory at home and re-cast junk batteries into new; latest achievement. We supply complete instructions and everything needed. Big Profits!

BATTERY LABORATORIES, Dept. PM, Minneapolis 4, Minn.

VARIABLE SPEED

HYDRAULIC POWER TRANSMISSION



It has Infinite Speeds 0 to 550, Reverse, Automatic Overload Protection; Adjustable Torque up to 180 inch pounds. 5/8" Input and Output Shafts. It will handle 1/4 to 1 1/2 H.P. Motor. Case measures 7 1/2" long, 7" high, 6 1/2" wide. VALUE OVER \$300. Shipping Wt. 25#. On C.O.D. Orders we require a 10% only Deposit. Fob. Chicago \$54.50

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SAY YOU SAW IT IN POPULAR MECHANICS

**KLEAN-
STRIP**

Peels off Paint

Clean • Fast

Non-Inflammable

No after-wash

Made by W. M. BARR & CO., Memphis, Tenn.



Set Up Your Own Welding Business—Save \$300 to \$500
Get Into Big Profits on Repair and Contract Work
"Build Your Own" big capacity arc welder and save! This HOBART generator plus your own hook-up builds a welder that will earn hundreds of extra dollars for you.

BUILD YOUR OWN TILTING ARBOR SAW!

SAVE
\$50
ORMORE

Exclusive GIL-BILT Build-It-Yourself Features

- No machining—build easily with hand tools only
- No blueprint reading—step-by-step pictorial plans, full scale patterns, actual photographs
- Sturdy wood, aluminum, and steel construction
- Capacity and performance of commercial saws selling for \$60 and up

GIL-BILT 10-INCH TILTING ARBOR SAW



- 27x28 in. table, 13 1/2 in. capacity in front of blade
- 10 in. blade cuts 3 1/4 in. deep, tilts full 45 degrees
- Floor model 34" high, table always stays level

- New Departure ball bearing arbor, 3 1/4" precision shaft turned down for 5/8" bore blades, alum. housing, shipped ready to run
- Jackscrew and 4 1/2 in. dia. handwheel lowers and raises blade
- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jack screw mechanism and handwheel, and all other metal parts (less blade). \$20.95
Same Kit with 10" Combination Blade \$24.90
Same Kit with 8" Combination Blade \$23.90



GIL-BILT 8-INCH TILTING TABLE SAW

- 21x27 in. table tilts full 45 degrees, 13 in. capacity in front of blade
- 8 in. blade cuts from 0 to 2 1/2 inches

- New Departure ball bearing arbor, 5 1/8" precision shaft turned down for 1 1/2" bore blades, alum. housing, ready to run
- Cast aluminum miter gauge and self-align, rip fence guide (same as above)

GIL-BILT Metal Parts Kit includes Plans, Ball Bearing Arbor, Miter Gauge and Bar, Rip Fence Guide, Machined Lock Knobs, Tilt Support Segments and All Other Metal Parts (less blade). \$15.95
Same Kit with 8" Combination Blade \$18.90



GIL-BILT 12-INCH BAND SAW

- Cuts to center of 24 inch circle
- Handles stock up to 6 inch thick
- 18x18 inch table tilts 45 degrees

- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two 5/8" bore Ollite Bronze bearings.
- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled.

- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rubber tired wheels. Choice of cast aluminum or make-your-own wood wheels on metal hubs.
- Uses standard 7/8 inch blades up to 4 1/2 in. wide.
- Fully enclosed mechanism for utmost safety.

GIL-BILT Metal Parts Kit includes Plans, rubber tires, 1/4 inch blade, hubs for wood wheels, ball bearing spindle, tilt mechanism, guides, table tilt segments and all other metal parts. \$16.95
Same Kit with two machined ready-to-install 12" cast aluminum wheels \$20.95

NO DEALERS—ONE LOW FACTORY PRICE! Return in 10 days for refund of purchase price if not satisfied. Prices include postage within 600 miles. Over 600 miles add 5%. Send cash, check, or money order for parts kit, or send \$1.00 for Step-by-Step Plans and order kit later less cost of Plans. Plans sent postpaid anywhere in the world.

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COMPLETE PLANS
only
\$100
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NEW CATALOG IN COLOR

It's New! The finest broadside on garden tractors ever issued gives you full details on the famous Speedex 2 1/2 H.P. walking Model C, and on the heavy-duty 8 H.P. riding Model 23. Illustrates many labor-saving uses, shows wide range of implements for plowing, discing, cultivating, mowing, snow removal, lawn mowing, etc. Gives you complete descriptions . . . full information. Supply limited—write today!

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BOX 216-DIA RAVENNA, OHIO

P-1150-42

Set Up Your Own Welding Business—Save \$300 to \$500

Get Into Big Profits on Repair and Contract Work

Let Hobart help you "build your own" welder and save \$300 to \$500 over cost of factory-built unit. Select the type and capacity gen-

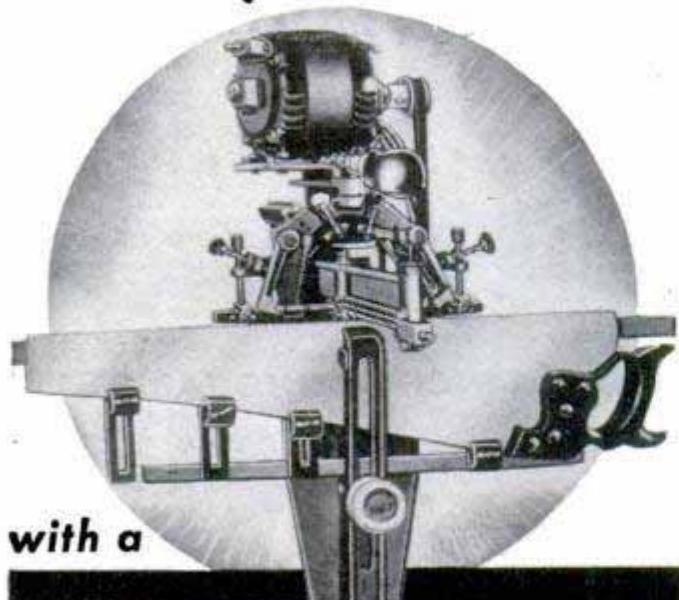
erator you want from our complete line and belt or couple to a good used auto engine. Don't miss this opportunity. Write for FREE booklet.

HOBART

HOBART BROTHERS CO., BOX M-11, TROY, OHIO

"One of the world's largest builders of arc welders"

Last Year's Profit \$3,000!



with a

FOLEY *automatic* SAW FILER

"Last year's profit amounted to \$3000. Not so bad for a one-man outfit"—from Charles C. Hough. James B. Williams wrote us—"I made \$765 last year filing saws, and it sure comes in handy. I do this work in my spare time." Men in communities of all sizes make up to \$2 or \$3 an hour with the Foley Saw Filer working full time or part time. That extra money comes in mighty handy in these days of high prices.

It's no trick to take care of the saw filing for your neighborhood hardware or lumber dealer—plus looking after the saws for farmers, townspeople, manual training departments and factories. The Foley files all hand saws, also band and cross-cut circular saws. It's a cash business, no canvassing, no eyestrain and no experience needed.

FREE BOOK

Shows How to Start

"INDEPENDENCE AFTER 40" shows just how you can start at home in your spare time—work in your basement or garage. It's an immediate cash business that can develop into a full-time repair shop. Send coupon today — no salesman will call.

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Minneapolis 18, Minn.

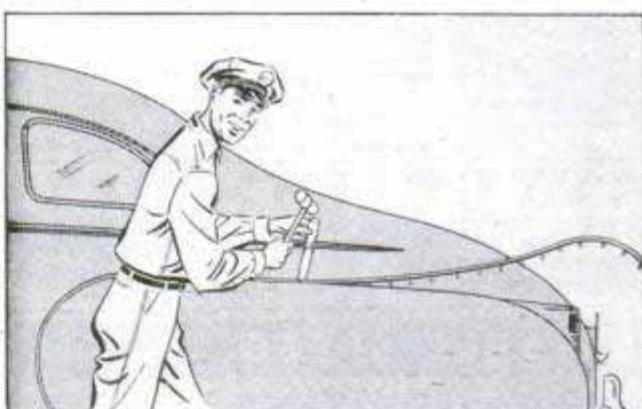
Send me free book "INDEPENDENCE AFTER 40."

Name _____

Address _____



Above, cloth welt is simply pounded into place with a hammer. Below, chrome welt is applied in same way



Replacement Fender Welts

Anyone can replace rotted or corroded felt welt on his car simply by driving a new strip in place without so much as loosening a nut. Two types of welt are available. One is formed of a steel wire covered with a latex-impregnated paper cord and cloth. The latex makes the welt completely waterproof. The other, for a de luxe job, is made of a flexible metal, chrome plated to match the original welt. Both types of welt are driven into the joint between the fender and body. Metal clips on the welt hold it in place.

During the 1950 travel year, nearly 33 million persons visited our national parks and monuments with Great Smoky Mountains in Tennessee and North Carolina, host to 1,774,000, leading the list of national parks in the United States.

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BRAND NEW

WAR SURPLUS BARGAINS

ALL FULLY
GUARANTEED

DIRECT CURRENT GENERATORS

For welders, plating, truck and marine use, D.C. appliances, lights, etc. Aircraft quality ball bearings. Lifetime grease sealed. Heavy duty.



Item #89—Type M-2, rated 50 Amps., 24 Volts. Mfd. by Leece-Neville Co. Shpg. wt. 32 lbs. Gov't. Acq. Cost \$176.00. F.O.B. Chicago. Now Only **16.50**

Item #90—Type P-1, rated 200 Amps., 28 Volts, 2500 RPM. Mfd. by General Electric, Ford, Delco-Remy and Westinghouse. Gov't. Acq. Cost \$300.00. Shpg. wt. 70 lbs. F.O.B. Chicago. **22.50**

Item #91—Type R-1, rated 300 Amps., 30 Volts. Mfd. by Jack & Heintz. Gov't. Acq. Cost \$380.00. Shpg. wt. 70 lbs. F.O.B. Chicago. **35.00**
Each individually packed in wooden box.

Item #99—**BRAND NEW**. Rated 15 Volts at 50 Amps. Use on 12 Volt circuits on trucks, tractors, ships, planes, battery chargers, auxiliary lights, etc. Base mounting with 4 bolt holes $\frac{5}{8}$ " threaded shaft with keyway. Mfd. by Bendix-Eclipse. Gov't. acq. cost \$136.00. Shpg. wt. 53 lbs. F.O.B. Chicago. **21.50**

Hydraulic CONTROL VALVES

ITEM #24. Four-way control valve with built-in relief valve, for use with one double action hydraulic cylinder, may be used with 1500 P.S.I. hydraulic system to open and close hydraulic cylinders. Ship. wt. 8 lbs. A \$38 value, postpaid.... **9.95**



ITEM #26. Four-way control valve for use with two hydraulic double-action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Ship. wt. 6 lbs. A \$60 value, postpaid.... **12.95**

LOGAN HEAVY DUTY HYDRAULIC PUMP

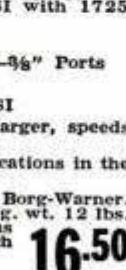
For operating hydraulic cylinders and hydraulic motors on tractors, bulldozers, construction machinery, lift trucks, industrial plants, etc. Delivers 10 GPM at 1200 RPM at 1000 P.S.I. using 6 HP. Has a $\frac{3}{4}$ " inlet, $\frac{1}{2}$ " outlet, $\frac{3}{4}$ " shaft with flat and keyway for direct or pulley drive. Has flange with 4 bolt holes for convenient mounting. Ship. wt. 22 lbs. Overall dimen.: $7\frac{1}{2}$ " L x $5\frac{1}{2}$ " H x $5\frac{1}{2}$ " W. A \$105.00 value. FOR ONLY **22.50** F.O.B. Chicago.

SELF PRIMING ALL PURPOSE PUMP

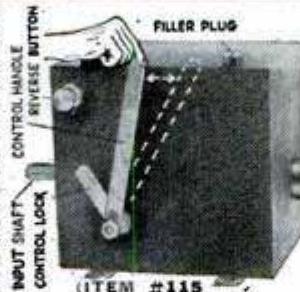
IDEAL FOR:

- Draining Basements
- Insecticides
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- Vacuum Pump — $26''$ for Milking Machines Lab use, etc.
- Air Compressor—for Paint Spraying, etc. Delivers 4.5 CFM at 40 PSI with 1725 RPM
- Home Water Systems
- 4-Ball Bearings— $\frac{1}{2}$ " Shaft— $\frac{3}{8}$ " Ports
- Rotate in either direction
- Rated up to 10 GPM, 120 PSI
- Use with $\frac{1}{4}$ HP motor or larger, speeds from 200 to 1800 RPM
- Useful for hundreds of applications in the home, farm and factory
- Built by PESCO — Div. of Borg-Warner. Gov't. acq. cost \$45.00. Shpg. wt. 12 lbs. Free: Complete instructions and performance data with each pump. F.O.B. Chicago.

NOW ONLY..... **16.50**



FINGERTIP SPEED CONTROL HYDRAULIC TRANSMISSION



(ITEM #115)

- USE FOR:
- Reamer Drivers
 - Midget Cars
 - Feed Mills
 - Canning Machines
 - OUTPUT SHAFT • CONVEYORS
 - Lathes
 - Milling Machines
 - Motor Boats
 - Cream Separators

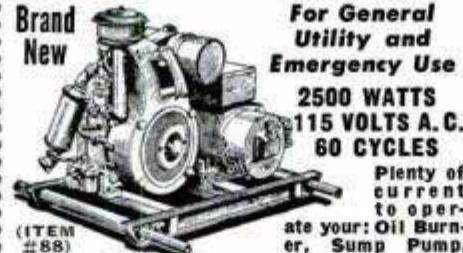
• Garden Tractors • Pumps • Blowers, etc. Variable output speeds ranging from 0 to input speed now available. Merely move control handle until desired speed is attained. Then turn locking handle to maintain the setting. Internal relief valves prevent overloading. Use input power of $\frac{1}{4}$ to $1\frac{1}{2}$ H.P.

This Westinghouse-Oil Gear Unit converted to commercial use from 40 MM anti-aircraft traversing mechanisms consists of a variable displacement hydraulic pump feeding a fixed displacement hydraulic motor. These components are contained in a crackle-finish steel oil reservoir (capacity 2 qts.). Adjustable relief valves set at factory for 100 inch pounds of torque may be reset up to 180 inch pounds. Independent reverse control allows full output power and speed selection in either direction of rotation.

Both input and output shafts measure $\frac{5}{8}$ " diam., include keyway. Input rotation is counter-clockwise facing shaft. Recommended input speeds not to exceed 750 R.P.M. Overall dimensions $1\frac{1}{2}'' \times 7\frac{1}{2}'' \times 11\frac{1}{2}''$. Gov't. acquisition cost, \$428.00. Shipping weight 26 lbs. Complete with 2 qts. of oil and full instructions. Postpaid.... **54.50**

AUXILIARY ELECTRIC A.C. GENERATING PLANT

Brand New



For General Utility and Emergency Use

2500 WATTS
115 VOLTS A.C.
60 CYCLES

Plenty of current to operate your: Oil Burner, Sump Pump, Refrigerator, Home Freezer, Power Saw, Lights, Radio and Television, Home Water System Pumps.

Complete integrated heavy duty electric power plant. Signal Corps Model PE-75, driven by Briggs & Stratton, one cylinder $6\frac{1}{2}$ H.P. Model 2Z, 4-cycle engine with killer button, oil bath air cleaner, governor, muffler, starting rope, and radio interference filter. The self-excited Leland generator is rated 2500 Watts, 115 Volts, 60 cycle A.C. single phase, belt driven, with guard and duplex receptacle. When generator is not in use, you can use the engine separately to power other equipment. Mounted on adjustable steel skids, notched for carrying poles. Net wt. 310 lbs. Shpg. wt. 440 lbs. Dimen.: $36'' \times 19\frac{1}{2}'' \times 24''$, 12 month guarantee. \$726.00 value. NOW **295.00** F.O.B. Chgo.

FREE: 1951 CATALOG

New 48-page catalog listing Brand New War Surplus bargains including Aircraft Quality hydraulics, A.C. generators, pumps, welders, tanks, and many, many others. You save on everything! Write for yours today!

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HYDRAULIC CYLINDERS

AIR or OIL

Large supply of new labor-saving, economical hydraulic equipment in many types and sizes. Use these positive, highly efficient, smooth pressure hydraulics on presses, arbors, lifts, loaders, power control, positioning, brakes, plastic dies, auto frame alignment, etc. etc.

ITEM #20—Purulator hydraulic oil filter. Permanent element type, $\frac{3}{8}$ " female pipe thread ports. Capacity, 16 gallons per minute. A \$13.00 value. Now Postpaid.... **4.95**



ITEM #4—All steel double action hydraulic cylinder, $1\frac{1}{2}$ " bore, $2\frac{1}{2}$ " stroke. Clevis mounting. Will lift 1000 lbs. with 1000 P.S.I. line pressure. Perfect for positioning and feeding movements. Shpg. wt. 4 lbs. Postpaid.... **4.95**

ITEM #33C—Double action hydraulic cylinder, $1\frac{1}{2}$ " bore, $4\frac{1}{2}$ " stroke. Clevis mountings at both ends. Uses $\frac{1}{4}$ " pipe fittings. Postpaid.... **8.95**

ITEM #32—Double action, $1\frac{1}{2}$ " bore, $4\frac{1}{2}$ " stroke, will lift 1760 lbs. with 1000 P.S.I. line pressure. Weight 8 lbs. A \$45.00 value. Postpaid.... **10.95**

ITEM #41—Double action hydraulic cylinder, $2"$ bore, $6"$ stroke, clevis mounting at base and end of shaft. Overall length closed $12\frac{1}{2}"$. Has $\frac{3}{4}$ " stainless steel shaft, uses $\frac{1}{4}$ " tube fittings. Will lift up to 3100 lbs. with 1000 P.S.I. line pressure. Weight 7 lbs. Postpaid.... **12.50**

ITEM #16C—Double acting hydraulic cylinder, $1\frac{1}{2}$ " bore, $26"$ stroke. Will lift 1760 lbs. with 1000 PSI line pressure. Weight 8 lbs. A \$55.00 value. Now Only Postpaid.... **16.95**

ITEM #103—Double acting hydraulic cylinder, $2\frac{1}{2}$ " bore, $17"$ stroke. Clevis mounting. Will lift 4900 lbs. with 1000 PSI line pressure. $1\frac{1}{2}"$ diam. shaft, $\frac{3}{8}$ " tubing thread ports. Overall length closed $28"$. Shpg. wt. 11 lbs. F.O.B. Chicago. **21.50**

ITEM #31C—Double action hydraulic cylinder, $3\frac{1}{2}$ " bore, $11"$ stroke. Aluminum alloy cylinder wall and all steel $1\frac{1}{2}$ " piston rod. Clevis mounting at base and shaft. $19\frac{1}{2}"$ overall length closed. Will lift 9625 lbs. using 1000 PSI from Logan Heavy Duty Hydraulic Pump. Uses $\frac{3}{8}$ " tubing fittings. Value \$102.00. Shipping wt. 11 lbs. F.O.B. Chicago.... **22.50**

ITEM #6-A—Double action hydraulic cylinder, $3"$ bore, $25"$ stroke, will lift 7070 lbs. with 1000 PSI line pressure. Steel barrel, $1\frac{1}{2}$ " stainless steel shaft. Gov't. acq. cost \$176.00. Shpg. wt. 26 lbs. F.O.B. Chicago.... **28.00**

ITEM #42—Double action hydraulic cylinder, $4"$ bore, $18"$ stroke. Rated lift capacity with 1000 PSI line pressure is 12,500 lbs. Ship. wt. 30 lbs. F.O.B. Chicago.... **32.50**

HIGH PRESSURE FITTINGS for cylinders and valves available at 50c ea. for $\frac{3}{8}$ " pipe and 65c ea. for $\frac{1}{2}$ " pipe.

NEW! Stationary or Portable

D. C. ARC WELDER 250 AMPS. MODEL 252

FOR ANY WELDING JOB LIGHT OR HEAVY

Stop Costly Repair Bills. Weld It Yourself and Save



Only one or two jobs will pay for entire welder. Designed for many years of trouble-free service. This precision engineered Direct Current ELECTRIC ARC WELDER is offered at but a fraction of its original value. It can be mounted permanently or easily transported for portable use. Does the job instantly where and when you need it. Has dial type rheostat for easy pinpoint control and a high-low range switch. Run welder at 2500 RPM from drive pulley or power take-off of tractor, a $7\frac{1}{2}$ HP electric motor or a 10 HP gas engine. Use two V belts or flat belt on pulley.

Now... AT A FRACTION OF ITS VALUE. Price includes double V or flat belt pulley and instruction book. Shpg. wt. 167 lbs. F.O.B. Chicago.... **99.50**

ACCESSORY KIT including welding helmet, electrode holder, two 10 ft. cables with clamp and 5 lbs. of assorted welding rods. (ITEM #66) Shpg. wt. 17 lbs. F.O.B. Chicago.... **10.50**

If more information is desired write for welder circular.

GROBAN SUPPLY CO., Inc., 1507 S. MICHIGAN AVE., Chicago 5, Ill., Dept. PM1

Built BIG! TO LAST YOU A LIFETIME



TEAM IT UP WITH YOUR SAW

You're equipped for construction, remodelling and the finest cabinet work of *every* kind with this big new Atlas 6" jointer in your shop. It planes a mirror-smooth finish, bevels, tongues, rabbets, end-joins, edges *in seconds!*



Rigid fence support, rabbet width scale.



Cutterhead removes for resharpening blades.

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MATCHED PRECISION TOOLS FOR
METALWORKING AND WOODWORKING

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Kindly send latest catalog showing 6" jointer.

Name _____

Address _____

City, State _____

greatest destruction. There's only a limited amount of energy available in any bomb—atomic or otherwise. If the enemy explodes a bomb at ground level, he causes greater destruction over a smaller area. Instead of using his energy efficiently to reduce a big area to rubble, he wastes it by reducing a small area to dust. It's no accident that the first bombs were exploded 2000 feet above Hiroshima and Nagasaki. This was the height precisely calculated to cause heavy damage over the widest possible area. Contamination of a small area adjacent to water is quite possible—but there's a very slim chance such a technique would be used except in areas where there are vital port facilities. Such port cities, of course, should consider the possibility of underwater bursts.

Q. Won't water be contaminated?

A. According to Col. James P. Cooney of the AEC, evidence accumulated so far indicates that, "after passing through a modern filtration plant, the water at the tap would be safe to drink."

With these facts to go on the city dweller can prepare to save his life.

If you live in a potential target area, assume that attack is inevitable—even though that is far from the case. You'll be fully prepared if the time comes.

Now, before the attack.

Volunteer for duty in your local civil-defense organization. More than 15,000,000 citizens must be trained in civil defense. An article in next month's issue will tell you how you can find a niche in the nationwide civil-defense plan.

Then—prepare yourself, your family and your home. Find shelter. The AEC says that "judging from observations made during tests . . . it is, in fact, not very difficult to design atom-bombproof structures which will enable life to survive directly below an air-burst bomb . . ."

British experts believe that a small steel shelter of the "Anderson" type, which proved so effective in the last war, is one answer. Covered with three feet of packed earth, this shelter, they believe, would ward off all three effects of the atom bomb, even if the burst were almost directly above.

An air burst wreaks a terrible destruction on the surface, but it causes little more than a shudder underground. The AEC calculates that a layer of 30 inches of earth at slightly less than $\frac{1}{2}$ mile from ground zero would reduce the radiation dose below the lethal level. And, of course, an underground shelter in most cases will protect occupants from the blast and flash burns.

(Continued to page 254)



New television microphone, developed at RCA Laboratories, virtually vanishes when in active use.

Vanishing Microphone lets the stars shine

Now you see it, now you don't! RCA's new "vanishing microphone" is plainly visible when standing alone—but let a television performer stand before it and it seems to disappear.

Called the "Starmaker," this RCA microphone is little larger than a big fountain pen... and principles of modern camouflage design blend it with an artist's clothing. There's no clumsy "mike" to distract your attention

from the artist—and it's also a superbly sensitive instrument.

Through research carried out at RCA Laboratories, the "Starmaker" microphone picks up sound from all directions—hears and transmits every sound the human ear can detect. It's not only small and almost invisible, but it's also one of the most efficient microphones ever devised.

* * *

See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, New York.



Known for brilliant pictures, RCA Victor's 1951 home television receivers also have the finest of sound systems—RCA Victor's "Golden Throat."



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LOS ANGELES

At this stage not many American families will consider an Anderson shelter, or even a cave in the back yard. The next best bet is to prepare the strongest spot in the basement of your home or apartment building as a shelter. Likely this will be in one corner of the foundation, where you'll have the protection of two strong structural walls. If you don't want to pour a concrete ceiling, strengthen the joists overhead. Be sure the spot you choose has two exits, as a single exit can be clogged with debris if the building caves in.

Stock your chosen shelter with items you may need—a shovel, rope, jack for lifting beams, an ax, a hose, a flashlight and a fire extinguisher or container of sand. Get rid of fire hazards in your home. At Nagasaki, the heat wave ignited dry materials as far as 10,000 feet from ground zero.

Fix a screen or cloth inside your windows to stop flying glass.

Stock your shelter with medications, especially bandages for cuts and ointment for burns. Store some drinking water in sealed jars, as the water pressure likely will fade to zero in an atomic attack. Open food may be contaminated by the fall-out so keep enough canned food in your shelter to last you a few days.

When an alert sounds.

Don't use the telephone. Don't rush outside in panic. Turn off the gas and water where they enter the house and check the pilot lights to make sure they are extinguished. Pull the master electric switch. Then join your family in the shelter.

Lie down on your stomach against the wall. If you notice a sudden bright light, the bomb has burst. Immediately cross your arms over your head.

If the alert sounds while you are away from your shelter.

Head for a subway if one is near-by. If you are in a building where no shelter has yet been designated, strike out for the basement and hug the foundation wall or an interior load-bearing wall. If you are in a skyscraper and fear you won't have time to reach the basement, get as close as you can to the center of the building, against a wall. Driving your car? Stop immediately, turn off the ignition, leave the keys in the car and head for the nearest shelter.

If you are caught in the open without an alert.

The only warning you'll have will be a brilliant flash of light, so bright you can't mistake it. Don't look! Whether you live or die may depend upon what you do in the next second.

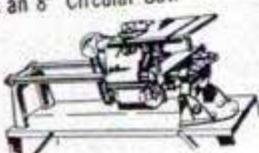
(Continued to page 256)

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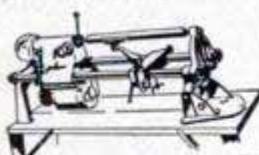
As an 8" Circular Saw



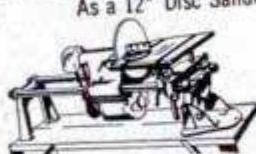
As a Horizontal Drill



As a 33" Wood Lathe



As a 12" Disc Sander



As a 15" Vertical
Drill Press

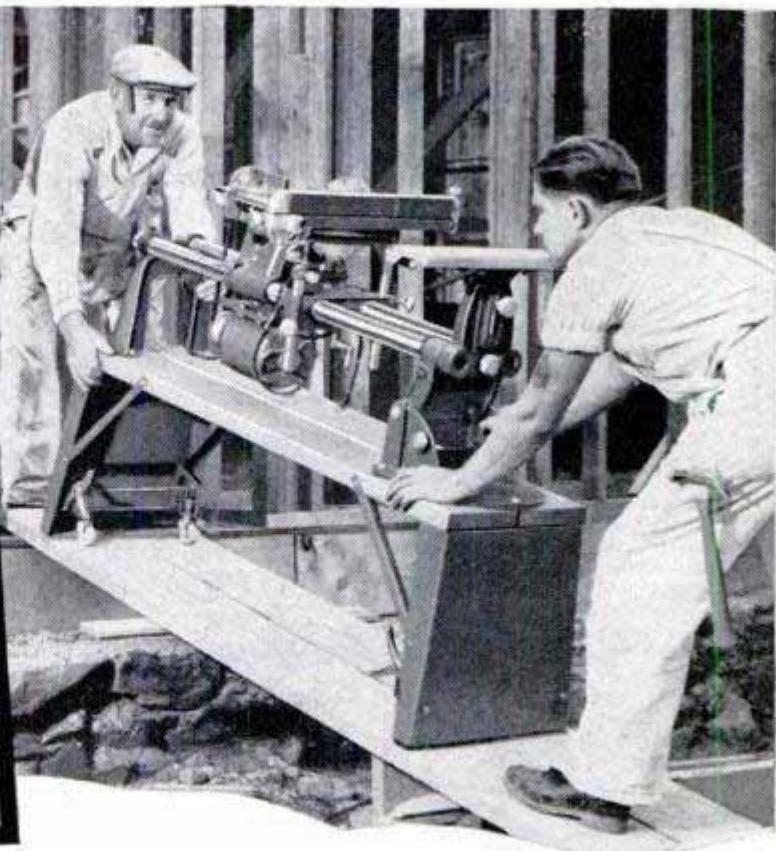


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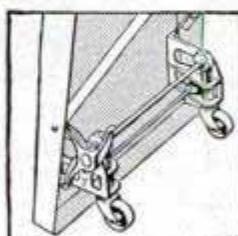
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$\frac{23}{64}$ " - .35	$\frac{23}{32}$ " - 1.05	$\frac{63}{64}$ " - 1.85	1 - $\frac{15}{32}$ " - 4.50
$\frac{3}{8}$ " - .35	$\frac{47}{64}$ " - 1.15	1" - 1.95	1 - $\frac{17}{32}$ " - 5.25
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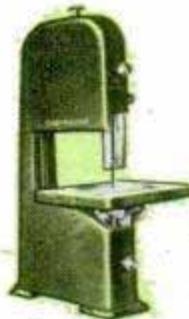
12" Drill Press . . . \$44.95
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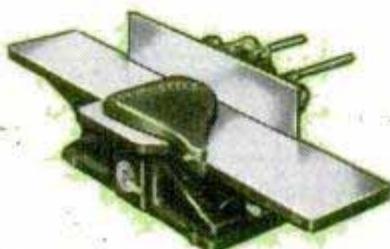
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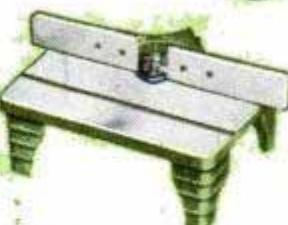


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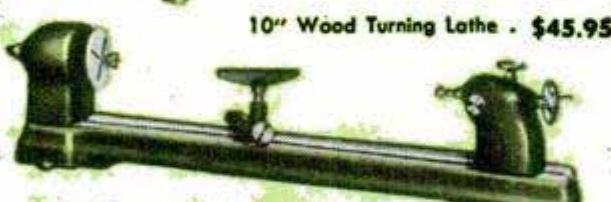


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Put on a pair of gloves and carry your old clothing to a spot where you can bury it. Drop the clothing into the hole, drop the gloves in, and kick dirt over the hole.

Then see if there is anything further you can do to help others.

None of these precautions can prevent ugly scars from appearing across the face of American cities. They can't save buildings or homes, they can't protect green parks or broad streets. But they can save lives—by the hundreds of thousands.

The Owners Report on the Nash Rambler

(Continued from page 145)

I was particularly interested to match my own opinions and test against the survey. I put the Rambler through its paces under all sorts of conditions between Kenosha and Los Angeles. This included a stop in Colorado to climb Pikes Peak. I climbed the Peak in 21 minutes, 11 seconds, from the race-day starting point (elevation 7500 feet) to the rocky top which is 14,109 feet high. The distance by speedometer was 12.1 miles. There are more than 150 curves and sharp hairpin turns and the steepness of the climb required use of second and low gears most of the way. The highway is excellent but it is a long steady climb of over 6000 feet. High gear could be used for less than a mile.

Two days were spent on the Peak making many tests, including descending the mountain in neutral. I consider this the most severe test to which brakes can be subjected. The early automobile stages up the mountain cooled their brakes with water dripping from small tanks onto the brake drums during the descent. The Rambler brakes are excellent; they not only withstood this severe test, but needed no adjustment even on arrival in Los Angeles, where the test ended.

The power of the car was amazing to me. I've driven many cars up Pikes Peak and none performed better than the Rambler. Its short wheelbase is a distinct advantage on sharp curves. It handles extremely well over rough spots and controls easily in a skid. Few cars make the journey without adding water but on three nonstop trips to

(Continued to page 260)

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the summit the Rambler needed no water whatever.

After the Peak test, I headed west across the Rockies for Los Angeles. In New Mexico I ran into a severe cross wind and dust storm which lasted nearly all day. Surely here was a test for a light car traveling at high speed! The Rambler handled exceptionally well and there is a feeling of safety in driving this car, even at speeds of 90 miles per hour (and the Rambler will do that and more with the overdrive, by the speedometer.)

It cruises nicely at 80 miles per hour with 75 percent throttle after reaching 80. It definitely is a fast road car and it stood up to punishment mile after mile at high speeds. The reason for excellent acceleration and speed is the Nash "600" six-cylinder 82-horsepower engine originally designed for a car weighing 650 pounds more than the Rambler. The overdrive is a fine feature and I would recommend it for anyone doing much country driving. The car used very little oil and the heat indicator showed near normal even in the heat of the desert. My gasoline mileage was extremely economical and it seemed to me that I must have saved at least a dollar every time I refueled as compared with larger cars. My mileage results at various speeds appear elsewhere in this survey.

As for comfort: Three can ride with ease in the front seat. The car has ample leg room for my 5-foot 11-inch body. The foam-rubber cushions give an excellent ride. The hood is quite wide and, looking over it, the car does not appear smaller than many full-size cars.

The heater is good and so is the vision. I agree with the owners' survey report that the radio could be improved and that the door operation appears heavier than necessary. There is no gainsaying that the trunk space is small on the convertible models. This is because much of the space is used to house the top mechanism. What price convertibles!

I ran into a severe rainstorm in Arizona and, believe it or not, not a drop of water leaked into the car—something I can't say for all postwar cars I've tested. The top mechanism is unique. Personally, I don't care for a convertible, but the Rambler design is excellent. Press a button and the top operates back and forth on a track. The door and body sides are permanent and they do offer some protection in case of accident.

Balance and stability of the car are good. A slight choppiness in the rear is the only noticeable evidence of its short wheelbase.

From my personal test, I would rate the Rambler as a first-quality light car.

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Gas or electric. Awarded from government.

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	12 gal. tank	50 gal. tank	50 gal. tank	50 gal. tank	60 gal. tank	60 gal. tank	80 gal. tank	80 gal. tank
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3/4" bore. NEW. \$9.95



1" bore. \$10.95
ROCKFORD CLUTCH Manual, bronze throw yoke 1 1/2" bore, 1" female spline; 5" long, 5 1/2" OD. Takes to 25 HP. PRICE ONLY \$15.00

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Grinding and saw arbor has 1/2" double end shaft, 11 1/4" long with 2" center pulley. New Departure double roll ball bearings. Right and left hand thread. Self aligning Dodge pillow block. 10,000 RPM. Bearings alone list at \$10. Complete arbor new. Stock #305 only \$5.95

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300 Watt, RPM 3400, 110 and 220 volt, 1/2" shaft \$40.00; 1000 Watt, RPM 1800, J15 volt AC 60 cycle \$109.00; 2500 Watt, RPM 1800, 115 volt AC \$165.00; 3000 Watt, RPM 2800, 110 volt DC motor ball bearing, 1" shaft. List \$343.00 to you at only \$99.00

ALL ITEMS GUARANTEED AS REPRESENTED

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It's unbelievable. 50 to 75% savings. Use for: Farms, cottages, stores, garages, flood-lighting, drilling rigs, refineries, house trailers, fire departments, sound trucks, yachts, tugs, construction, airports, police radios, etc.

5 KW 120 Volts 60 cycle AC. ENGINE: Hercules 4 cycle. Gasoline. GENERATOR: Mfr'd by Hobart Bros. Unit includes remote control cable, 150' 2-wire, #6 and 150' 3-wire, #18, exhaust pipe, power cable plug, KVA at 80% power factor, radio and television filtered. Unit is completely automatic. List price today \$1900.00. Now priced for you at \$875.00. 2500 Watt, AC 115 volt 60 cycle, single phase. ENGINE Briggs & Stratton, air cooled, 6 1/2 HP GENERATOR: Westinghouse or Leland belt drive. Complete with \$30.00 worth of spare tools, instructions and fully GUARANTEED. Was formerly priced at approximately \$700.00.

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750 to 1000 watt, all single phase, 110 volt AC NEW \$189.50

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All units 10,000 watts and over, 110-220 single or 3 phase. LIGHT PLANT BUYERS. In emergency telephone collect-unit shipped same day!

LIGHT PLANT BUYERS

For BARNS, ATTICS or BASEMENTS. Increases cows milk production.

20" fan driven by 1/4 HP motor. Switches and thermostat similar to heat control at upper left included \$89.50

Available in other sizes.



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Available in other sizes.

GEAR REDUCER

Double reduction. Operates on any 1/6

to 1/2 HP electric motor. dummy elevator, operate turntable, electric garage door opener, television antenna. REGULAR \$45.00 NOW ONLY \$22.00

22 RPM. Can be used as winch, barbecue, thermostat, etc.

OPERATE TURNTABLE, ELECTRIC GARAGE DOOR OPENER, TELEVISION ANTENNA. REGULAR \$45.00 NOW ONLY \$22.00

Double reduction. Operates on any 1/6 to 1/2 HP electric motor.

Dummy elevator, operate turntable, electric garage door opener, television antenna. REGULAR \$45.00 NOW ONLY \$22.00

22 RPM. Can be used as winch, barbecue, etc.

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Only Bolens Power-Ho DeLuxe Garden Tractor gives you:

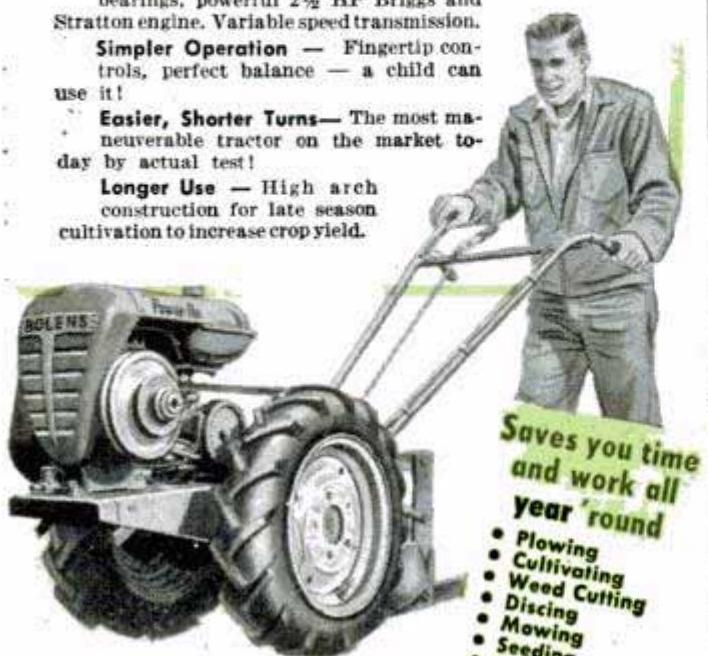
Quicker Hitching — Patented front Snap-Hitch and back drop-pin for 10-second attachment of 19 different implements!

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Simpler Operation — Fingertip controls, perfect balance — a child can use it!

Easier, Shorter Turns — The most maneuverable tractor on the market today by actual test!

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5 extra value features

Do more yard and garden jobs faster and easier!



Prove it to yourself! These 5 features make the Bolens Power-Ho Deluxe superior to any other garden tractor. It delivers easier, faster operation and more all-round usefulness—to your complete satisfaction. Only Bolens, the garden tractor pioneer, can offer these exclusive features. See your Bolens dealer today.

Compare dollar-for-dollar and you'll buy Bolens!

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Food Machinery and Chemical Corp.
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Eight-Mile-High Jump

(Continued from page 122)

Flooring covered all but the right forward section of the bomb bay, where a set of vertical rails was installed. Small rollers along the sides of the chair's back fitted inside the rails and below the seat a steel bar connected to a bomb shackle acted as a support until the drop signal was given. Ten seconds before he fell, the jumper's oxygen intake was switched from the crew's supply in the plane to his own bottle.

Tension built up fast during those last minutes before each test. Busiest and most concerned of all was Master Sgt. Isadore Rosenberg, who made the last-minute inspection of release mechanisms on the four parachutes used in the drop, all of which he had personally packed; checked the life-sustaining oxygen connections and the seat-belt release; connected and verified the radio and telemetering apparatus, and armed the timers that dropped with the chair. There were 27 items on his final check list, and we all knew that a failure of certain ones could cost a life.

Sitting in the "hot seat" at 42,176 feet, while Sergeant Rosenberg systematically performed his final chores and Capt. Philip Maher jockeyed the ship through a radar-scribed pattern, I had a few hurried moments to consider my next step — which turned out to be the longest "step" a man had ever taken. I remember thinking as the final seconds were being counted out . . . 10, 9, 8, 7, . . . that this would be like swiftly dropping . . . 6, 5, 4, . . . downward in an express elevator of a very tall building . . . and I wondered . . . 3, 2, if I'd be right . . . DROP!

What happened? I was just sitting there in space, the small stabilizer chute had opened and the airplane was drifting lazily away from me. It left light vapor trails. The windstream was gentle and although the air felt cold, (I learned later it was 55 degrees below zero) I wasn't at all uncomfortable. Not until I looked at the altimeter attached to my right arm, above a stop watch Sergeant Rosenberg had started 10 seconds before I fell, did I realize I'd already dropped 6500 feet.

Over the two-way radio I told the ground crew that all was well. Although almost seven miles away, they knew more about my physical condition than I did. A record of every breath I took, every heartbeat, and my temperature at such widely separated points as my neck and my feet, was being instantly relayed over the telemetering circuit.

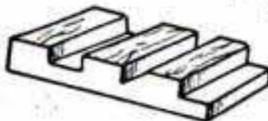
My aerial perch suddenly began to spin,

(Continued to page 264)

DELTA SAW USES ARE UNLIMITED

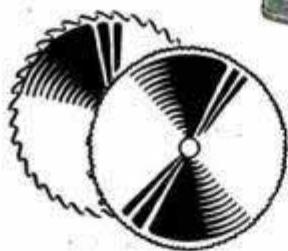
and only Delta
offers you
all these
features!

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DADO CUTS UNLIMITED

Delta's No. 333 Dado Set will straight dado, gain, plough, rabbet, groove, spline cut and do all jobs with and across the wood grain!



MAKE ALL BASIC SAW CUTS

Cross-cut, miter, rip, bevel, cut-off, double miter, angle rip and any variation made easier. Delta furnishes the right blade for every job!



Free!

Catalogs and bulletins on complete Delta line.

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DELTA POWER TOOL DIVISION



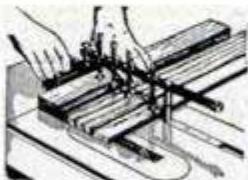
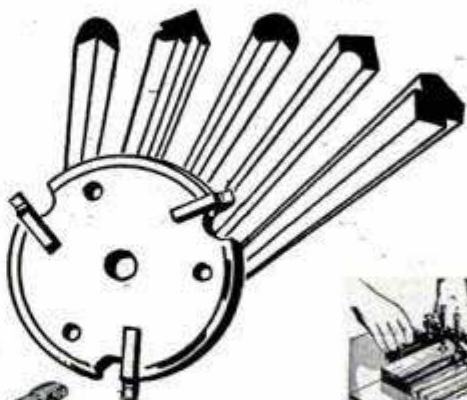
Rockwell

Manufacturing Company
MILWAUKEE 1, WISCONSIN



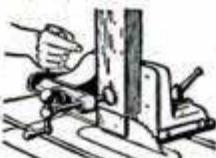
MAKE THOUSANDS OF SHAPES

Here's a real value! One low-cost Delta Moulding Cutterhead Set like this No. 34-813 makes your saw a shaper! And Delta's 27 different Moulding Knife Sets give you thousands of shapes!



CUT ODD SHAPES SAFELY

Exclusive Delta clamp attachment No. 865 on miter gage holds odd-shaped pieces firmly, safely and accurately!



CUT TENONS ACCURATELY

Delta Tenoner No. 1172 safely cuts square, parallel tenons in sizes to full capacity of saw for furniture, storm sash, screens, doors, etc.



CUT METALS AND OTHER MATERIALS

Cut thin-wall tubing, solid bars or sheets—cut tile, brick, bakelite, plastics, porcelain and other materials with proper blade or abrasive wheel!

"HOW-TO" HELPS

Only **DELTA** makes a full accessory line — provides ideas and easy-to-follow instructions on how to get the most out of **DELTA** power tools. Take advantage of the exclusive **DELTA** "over-all" service — keep your power tools busy — take on new jobs — have fun and make new profits with **DELTA** power tools and accessories.

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AT LAST!
A Power Mower that's
really BUILT to fine
Engineering
Standards

This new rotary power mower chops grass and weeds to a fine mulch, no matter how tall or tough they are. Cuts 19 in. swath. Mows right up to walls and buildings—no trimming needed afterward.

Precision-made, using finest materials. "Sta-Temp" hardened and tempered blade—easily resharpened with hand file. New Departure bearings on drive shaft. Belt drive. Deep housing to protect blade from rocks, etc. Semi-pneumatic tires.

Worcester mowers have been famous for over 50 years. See this great new Worcester at your dealer's today!

DEEP PROTECTIVE HOUSING AND FRONT GUARD

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1.6 h.p.
4-cycle Engine



Worcester ROTOR MASTER

Send for Free Lawn Mower Folder
WORCESTER LAWN MOWER COMPANY

Division of Savage Arms Corporation, 84 Broadway, Chicopee Falls, Mass.

11 pc. SOCKET WRENCH SET!

WITH REVERSIBLE RATCHET AND EXTENSION

• The only 1/4" square drive Socket Set with a 4" reversible ratchet handle. Has strength of larger sets. For carburetors, distributors, radios, TV sets etc. Made of highly polished chrome plated alloy steel, heat treated for super strength. Sockets accurately broached. Small diameter extension for hard-to-get-at places. Spring loaded ball on ratchet drive and extension. At your dealer or order direct from factory. Unconditionally guaranteed.

Reversible Ratchet 4" Extension
 $\frac{1}{16}$ " Socket $\frac{1}{16}$ " Socket $\frac{1}{8}$ " Socket
 $\frac{1}{32}$ " Socket $\frac{1}{16}$ " Socket $\frac{1}{32}$ " Socket

$\frac{1}{8}$ " Socket $\frac{1}{16}$ " Socket
 In Pocket Size Plastic Kit, $2\frac{1}{4}$ " x $4\frac{1}{2}$ "



METEOR MFG. CORP. 1441 MAIN ST. BUFFALO 9, N.Y.

Enclosed is check _____, money order _____ for \$4.00
 Send Meteor Socket Wrench Set to:

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first to the left, and then to the right, until I managed to stabilize it by working the rudder and extending my right foot forward, then twisting it around to the right side of the seat. For a while I was tilted to an almost complete face-down angle.

Though I was too occupied at the time to indulge in arithmetic, a comparison of my altimeter and stop watch would have shown that I'd already dropped 20,000 feet, most of it at more than 180 miles an hour. On one of our jumps, Capt. Richard V. Wheeler had dropped at a rate of 319 feet a second, or about 217 miles an hour.

At 14,600 feet, preset automatic releases freed the small stabilization parachute, allowing it to pull the control cable to open the lap belt and then act as a pilot chute to withdraw the 16-foot retarder chute from the container behind my head. At this stage the occupant would normally be free to step or push himself from the chair and continue earthward. Once clear, a line from the seat would pull the rip cord on his parachute.

Instead, I thought I'd see what would happen at this point to an unconscious man, unable to do anything about separating himself from the chair. I waited only an instant. Then I felt a slight jar as the seat was pulled away and a second or two later my canopy billowed open with a light initial shock.

It was a slow descent the rest of the way, with my chair and me riding our separate, big parachutes. I felt quite nauseated from about 10,000 feet down, an aftermath of the spinning increased by the discomfort of my heavy clothing. What had been vital protection at the start of my jump, less than 12 minutes before, at 55 degrees below zero, was rapidly outliving its usefulness as I drifted toward the hot desert floor.

Almost as soon as I touched ground, on an easy landing, the flight surgeon came down near by in a helicopter and a ground crew arrived by truck. Aside from the understandable nausea, I was in good shape.

We've decided that the greatest danger in high-altitude escape is the inability to judge altitude above the terrain or time of fall, and that the safest solution is use of an automatic opening device on parachutes. Depth perception, bad over the desert, would be equally misleading over water. Gambling with human judgment under the confused circumstances of emergency bailouts is a foolhardy risk.

The spinning we couldn't control on the 12 chair jumps may alter the way we use ejection seats. It was assumed that putting the emergency oxygen supply on the seat and stabilizing the seat with a drag chute

(Continued to page 266)



Meet "SUZY"-a POWERFUL good friend to have around the house!

"SUZY KIT" — a complete workshop including a $\frac{1}{4}$ h.p.

PORTABLE POWERHOUSE and 27 PIECES, all for only \$24.95



"SUZY" polishes drills brushes mixes paint saws buffs sharpens sands scrapes grinds routs



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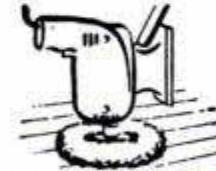
ROUTING & SAWING



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Let "SUZY" do it!

You can do every household job the easy way when "Suzy" comes to your house! For "Suzy" is a 27-piece kit with a powerhouse motor and all the practical accessories you need to buff andirons, polish cars & floors, sharpen knives and tools, scrape rust, sand woodwork, mix paint, drill holes, saw patterns, do scores of other jobs.

Never before has there been offered a kit so practical, so complete, so inexpensive and so powerful. Turn the motor on and things really happen, because "Suzy" packs $\frac{1}{4}$ horsepower. And when she winds up to 3000 r.p.m., nothing will stall her out! In your hand, she's light & easy to operate, weighs only 4 lbs.

Vic Downing, Pres. of Bertram Engineering, and designer of famous Bull tools, has this to say about the new kit: "I believe that 'Suzy' is the greatest tool value ever offered by Bertram or any other company."

YOUR MONEY WILL BE REFUNDED
immediately and without question if "Suzy" does not satisfy you completely after 10 days use in your home.

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ALL THIS FOR ONLY \$24.95

Most powerful $\frac{1}{4}$ elec. drill on the market, equipped with new "Handi-handle" that eliminates operator fatigue • new keyless chuck • adapter • 5" rubber pad • 6" sheepskin bonnet • 6 assorted sanding discs • 7 assorted high-carbon steel drills • drill stand for bench work • arbor • grindstone • cloth buffering wheel • wire brush wheel • new router bit that also saws like a jig saw • handle and special clamp for floor polishing • Complete, as pictured, \$24.95.

11-PIECE KIT (includes same drill motor with "Handi-handle," 6" sheepskin bonnet, 6 sanding discs) \$19.95

FLOOR POLISHING ATTACHMENT (For those who own any $\frac{1}{4}$ elec. drill). Includes handle and drill clamp, adapter, 5" rubber pad, 6" sheepskin bonnet, only \$4.95.

BERTRAM E. ENGINEERING & SUPPLY CO.

3121 MAIN STREET

KANSAS CITY, MO.

The Original Low Cost 8" Tilt/Arbor Saw!

Atlas

POWER KING



STILL TODAY'S BEST BUY!

Many have copied it—but no one has successfully included *all* the performance features of this Atlas-Power King at anywhere near the price! Here is just about everything you could want for all your home and furniture construction projects. A saw that speeds your work, keeps it accurate—a saw built to give you a lifetime of good service at low cost. See it at your Atlas-Power King dealers.

Some of the Outstanding Features

- ★ Tilt/Arbor, Ball Bearing Construction!
- ★ 2 $\frac{5}{8}$ " Depth of Cut—Greatest In Its Class!
- ★ 11 $\frac{1}{2}$ " Table Surface Ahead of Blade When Cutting 1" Stock!
- ★ Big Precision-Ground 16" x 20" Grey Iron Table! 34" x 20" With Two Low-Cost Extensions.

★ Quick Positioning Rip Fence—Locks At Both Ends.

**FREE Catalog and Shop Hints
Send a Post Card**



ATLAS PRESS CO.

135 N. Pitcher St., Kalamazoo, Mich.



**MATCHED PRECISION TOOLS FOR
METALWORKING AND WOODWORKING**

would mean one less item to burden the jumper and would avoid the disadvantages of tumbling on a long descent.

From reports on bail-outs from 37,066 and 41,586 feet—without seats—it may be better to free the jumper from his seat immediately after ejection, dependent on an oxygen supply strapped to his suit. Both our test subjects on the high drops preferred the free falls, even with the tumbling, to their spinning, chair descents. An automatic device would still open the main parachute at a preset safe altitude and the retarder chute could be eliminated.

We have chipped away a big chunk of the mystery surrounding the problem of making very high altitude emergency bail-outs safe. Now pilots may use the system with confidence, while we continue to work for further improvements.



Tractor Extension Kit

With a new 16-piece kit the owner of a Ford tractor can raise the seat, steering wheel, foot pedals, hydraulic lever and footboards approximately 12 inches. The kit is designed for farmers who desire to ride higher, thereby increasing their visibility and escaping from some of the dust of the tractor wheels and implements. The 16 pieces of the extension kit can be installed without drilling holes.

Diagnosis By TV

Patients in rural hospitals may some day have their X-rays studied by medical specialists in distant cities with the aid of television. The X-ray pictures would be broadcast to the city hospital by television, enabling the rural doctor and the city specialist to confer while studying the same picture. The TV image is better in some respects than the original because contrast can be increased for easier reading, and special areas can be magnified by the use of a telephoto lens.

MARVEL MYSTERY OIL



JAN. 1, 1951

A New Year's Resolution for your car

A trouble-free year is ahead for you if you use Marvel Mystery Oil in your automobile crank case. Prevents motor deterioration, sticky valves, gum formation and ring sticking... gives you added power and mileage through smoother, better lubrication. Marvel Mystery Oil has no equal. Ask your dealer and obtain expert advice about it or write for free information, Dept. No. 113.



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242 West 69th St., New York 23, N.Y.



MONEY for MEN ALL DATA FREE

THE PLASTEX Industry needs manufacturers on small scale and for big production of Lamp and Clock Stands, Art Goods and Novelties in Plastex and Marble imitation. Experience unnecessary. Lac material makes regular 10¢ store sellers. Rubber moulds furnished for speed production. Small investment brings good returns. We are now placing big Chain Store Orders with manufacturers. Ambitious men have chance for real prosperity. Our Free booklet will interest and benefit you.

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LAWN ORNAMENT - NOVELTY PATTERNS

28 Lawn Ornament Patterns, 25¢. Other Patterns; 15-20" high; Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10¢ each. 25 Novelty Patterns, 30¢. All 62 Full Size Patterns, \$1.00 Postpaid. Strother Pattern Service, Dept. CA-8, Box 128, Belington, W. Va.

START A BUSINESS this quick way



with

FOLEY LAWN MOWER SHARPENER

"I have taken in 100 mowers in 5 weeks since I got my Foley,—with no advertising," says George C. Wise. "In two months I have sharpened 155 hand mowers, 6 power mowers and 1 trimmer. My machine has paid for itself and everything I take in now is all profit"—from Otis Zacharia.

Here's a business you can start in spare time, and begin to make a CASH PROFIT right away. The Foley handles up to 3 or 4 mowers per hour, and prices run \$1.50 to \$3.00 for hand mowers, \$5.00 to \$8.00 for power mowers.

FREE BOOK "HOW TO SHARPEN POWER MOWERS" shows just how to sharpen any make of power lawn mower with the Foley. Prices \$97.50 to \$159.50—easy payment terms available. Mail coupon today—we'll also send **FREE PLAN** telling how to start your own business without previous experience. No salesman will call.

FOLEY MFG. CO. 107-1 Foley Bldg., Minneapolis 18, Minn. Send **FREE BOOK**, "How to Sharpen Power Mowers", and **FREE PLAN** on lawn mower business.

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Safe Boats With Full Length Spray Rails

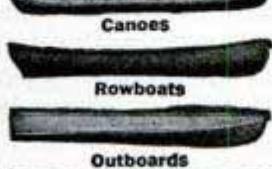
Keep passengers perfectly dry—even at high speeds. Catalog also shows two new models of "Take-Along" Boats. Two big factories—save you freight.

CATALOG FREE
Write for your copy. State kind of boat in which you are interested.

THOMPSON BROS. BOAT MFG. CO. (151)
213 Ann St. PESHTIGO, WIS. (Write to either place)



Better Built Lower Prices



Light Boat for Auto
113 Elm St.
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To make fine things...
use the finest saws made!

ATKINS



Craftsmen who take particular pride in their work — those who saw for profit and those who saw for a hobby — insist on Atkins precision-made, genuine "Silver Steel" saws. They have learned by experience that these fine tools are stand-outs for quality, unmatched for value!



ATKINS NO. 400

Here's the straight back, ship point hand saw that's long been favorite from coast to coast. True temper ground. Perfection Pattern handle. Mirror polish.



ATKINS NO. 36 NEST OF SAWS

Molded pistol grip handle. Compass, keyhole and nail cutter blades, easily interchangeable. Three cutting angle adjustments.



ATKINS NO. 37

COMPASS SAW

Tenite utility grip. 17 x 18 gauge, hardened, tempered and polished. Slotted end for interchangeable blades. 8 points per inch. Blade reversible.

Only ATKINS makes
"Silver Steel" products

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SAWS

for every purpose
for every person
for every purse



E. C. ATKINS AND COMPANY

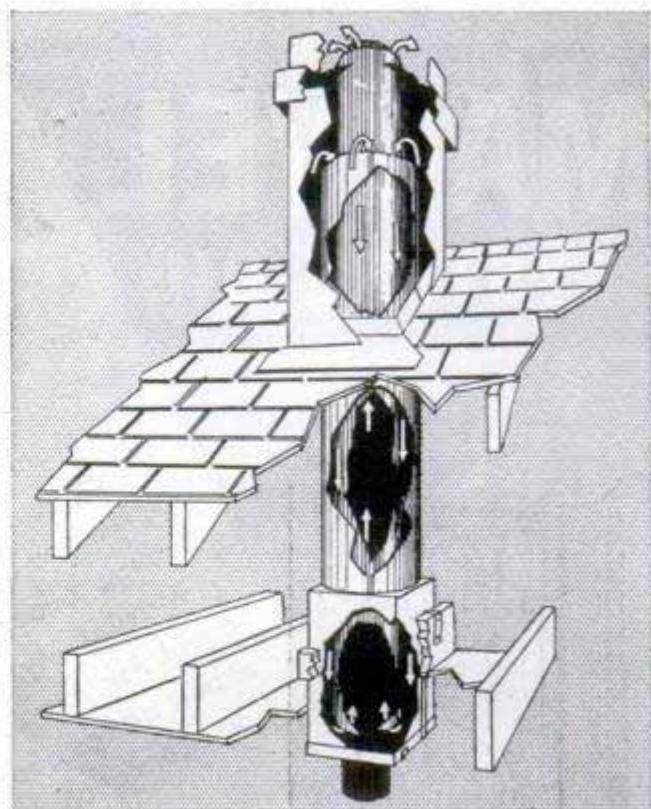
Home Office and Factory:
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Aluminum-Jacketed Flue

Air circulating between two aluminum ducts surrounding a steel flue increases the efficiency of a new packaged chimney that can be erected by one man. The air spaces reduce the heat escaping from the flue, keeping its surface temperature below 1000 degrees Fahrenheit, even at entering temperatures of 1750 degrees. The lightweight material has a low heat capacity, enabling it to warm and provide the maximum available draft quickly.

Easily Molded Glass Transmits Infrared Rays

For the first time, a glass has been made which can be easily molded yet transmits infrared rays. The two characteristics will make the glass useful in optical-research instruments and in weapons which are actuated by infrared wavelengths. Dr. Rudolph Frerichs of Northwestern University discovered that arsenic, combined with sulphur, forms a new reddish-colored glass. Heretofore, natural or artificial crystals have been used in infrared instruments, but the size of the optical parts was limited. Ordinary glass can be molded but won't transmit infrared rays. The new glass has a melting point below 300 degrees Centigrade and can be molded easily.

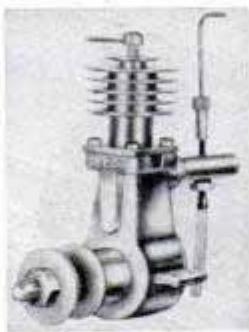
Canes for blind persons made of semi-transparent plastic are illuminated in a series of flashes by touching a trigger on the handle.

Our 352nd Advertisement

REAL DIESEL ENGINE!

\$2.95

You just can't beat this price for a completely assembled precision diesel engine!

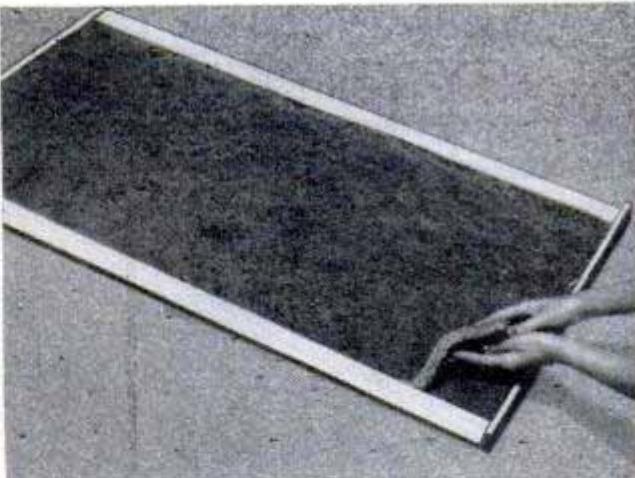


- Ideal for planes, boats, midget cars
- Actually runs at 7500 RPM, produces 1/7 HP
- Height a full 3½ inches; weight 5 ounces
- Comes to you completely assembled, ready for operation

MAYBE WE'RE CRAZY, giving away a precision diesel engine, complete with cylinder and piston, carburetor, crankshaft, connecting rod, etc., for ONLY \$2.95. But we're selling thousands of DEEZILS all over the world, and that keeps our production costs down. DEEZIL is streamlined, compact, rugged. Starts quickly, easy to install, runs for years! Fast delivery if you ORDER DEEZIL TODAY!

Send \$2.95 plus 25c postage

GOTHAM HOBBY CORP. Dept. P, 107 E. 126 St.
NEW YORK 35, N. Y.



Sawdust Lawns For City Dwellers

Prospects are brightening for city dwellers who want green lawns to cover concrete terraces and asphalt roofs. A light-weight material, coarse granular wood sawdust, soaked in a chemical plant-food solution and then dried in the sun, is now available as "soil." It can be spread an inch thick on window screening, with a retaining wood rim around the edge and thin wood strips beneath it to insure good drainage. Quick-sprouting varieties of grass will appear in a few days.

Plastics Outdo Stainless Steel In Repelling Corrosive Acids

Plastics known as phenolic resins are so acid resistant that they even surpass stainless steel. Completely unaffected by the acid, a 60-foot plastic tank has been in use for 12 years with no apparent damage despite a daily diet of more than 100,000 gallons of boiling sulphuric acid. The resins are produced by heating carbolic acid and formaldehyde until a heavy syrup is formed. This syrup is then mixed with sand and sulphuric acid and within a few minutes the mixture becomes a hard, acid-resistant solid.

Radar Paints Hurricane Portraits

By using more than one radar to plot and "photograph" a hurricane, Army scientists are able to draw an accurate picture of the storm's contour, force and direction. A single radar has been used in the past, but this produces a picture of only one side of the hurricane. Now, strategically located radar sets make long-range pictures of a storm as it passes between them, thus revealing the true boundaries of the disturbance. The new technique may lead to a nation-wide network of radar weather stations.

NOW! Foredom offers a POWER-PACKED 14000 RPM 1/15 H.P. FLEXIBLE SHAFT MACHINE YOU can afford

ONLY \$29.60 including 6-STEP FOOT RHEOSTAT

Model 9050



3-WAY USEABILITY

• Hang it up • Set it on Bench • Mount
Foredom's Model 9050 gives you industrial **under Bench** quality at a popular price. Here is what you get: • 14000 rpm 1/15 H.P. air-cooled universal motor • precision-made pencil-size, quick-detachable handpiece • flexible shaft of extra good flexing qualities running in a metal sheath covered with tough, long-lasting Neoprene. Here's a small power grinder with the kind of power, speed, stamina and all-around versatility you have been waiting for. TOPS THEM ALL. For commercial users and home users who insist on industrial quality in their tools.

Use it to **grind, polish, drill, saw, sand, carve, mill, clean, rout, etch, engrave, etc. on all metals, wood, plastics, glass and linoleum.**

Includes your choice of 3/32" or 1/8" capacity collet. Add 85¢ if you want both.

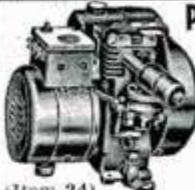
Backed by Foredom's 28-year old reputation for quality and workmanship. Other motor-driven models for as little as \$17.75, all precision-made.

Catalog 1137-E on request.

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Portable LIGHT PLANT

PUSH BUTTON START
500-700 watts 110-120 v. - 60 cyc. A.C. Powered by a sturdy dependable, easy starting, air cooled 2 hp. gas engine. No wiring necessary, just plug in and operate. Plenty of current for oil burner, emergency lights, freezer, radio, incubator, etc. Complete protection against current failure. Ideal for hunting or camping. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. Wt. 85 lbs. Fully guaranteed. Be prepared if electric power fails. Reg. \$275.00 value.....

\$138.50

GIANT 2000-2500 WATT PLANT

Absolutely the best made because its heavy windings develop up to 5000 watt overload for motor starting. Skid-mounted—portable. Powered by 5 h.p. easy starting Briggs engine.

—Complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty and instructions included. Wt. 220 lbs. Reg. \$585.00. Spec. at **\$289.50**.

GENERATOR ONLY and control box. Drive it with your engine or tractor. **\$169.50**.

HOT WATER HEATER

(Item 26) Immersion type, heavy duty, 115v. A.C. 300W. Does not require watching. Thermostat shuts off at 165°. Keeps water hot for shaving, washing, dishes, etc. Also good for keeping water from freezing in big troughs or tanks. Made by Cities Service. Wt. 4 lbs. Worth \$9.50. Our Spec. **\$4.50**.

GAUGE TESTER

(Item 27) Precision made of solid bronze by Star Brass Co. Calibrated weights acting against hydraulic piston, provides quick, accurate testing of all pressure gauges up to 3000 lbs. per sq. in. Brand new in hardwood cases. Wt. 100 lbs. Reg. \$435.00. Our spec. **\$125.00**.



All items brand new. Prices f.o.b. Chicago area. Money back guarantee. Send check or M.O. The A & K EQUIPMENT & SUPPLY CO., Dept. 61, Burlington, Wis.



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(Item 16) 40 ft. heavy duty, made of specially insulated No. 14 2-conductor wire. So tough that you can drive over it and yet amazingly flexible and easy to handle. Resists oil, grease or water. Extends electricity up to 400 ft. without voltage drop. Use indoors or outdoors. Complete with heavy rubber plug and outlet. Wt. 2 1/2 lbs. Usually \$4.50—Special **20 ft. \$1.95**, Comb: 2-40 ft. and 1-20 ft. (total 190 ft.) **\$4.95**.

PRESSURE SWITCH

(Item 30) Penn Electric Model 110 BPO2, best made. For pumps and air compressors. Heavy duty. Will handle up to 250 lbs. press. and up to 5 h.p. Autom. unloader valve, for easy starting. 110-220 v. A.C. or D.C. 2 pole. Wt. 4 lbs. Reg. list \$17.50. Our Spec. **\$8.95**.



HYDRAULIC HOSE

High pressure, heavy duty, complete with swivel fittings. Pipe thread connections. Ideal for farm equip., bulldozers, grease guns, airbrakes, etc. Any length. Minimum order \$2. INSIDE DIAMETER 1/4" 40¢ per ft. 3/8" 50¢, 1/2" 70¢, 5/8" 90¢.

PARTS WASHER

(Item 20) Store gas or carbon tet, in 5 gal. safety can. Valve releases just the right amount into washing compartment. Parts are washed and drained on a "dunking" screen — no fishing for parts. Eliminates fire danger, waste, spillage, evaporation. Wt. 14 lbs. Reg. \$19.50—Special **\$4.95**.



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New genuine Neoprene Hose—outlasts ordinary rubber 3 to 1. Reinforced with super tough cotton cord plies. Flexible. Easy Flo brass couplings with standard pipe threads for quick connections, included. Pump water for irrigation, stock tanks, home, barn, fire fighting, etc. Pump Gas or Fuel Oil. Save more than 60%. (Inside Diam.) 1 1/4" 1 1/4" 1 1/4" Length 25 ft. 40 ft. 30 ft. Price 9.25 14.75 14.75 If specified we will send special hose for gas or oil at same prices.



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(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range, removes kitchen smoke and odors. Powerful continuous duty motor, 110-120 v. A.C. Quiet, super efficient fan moves huge volume of air (400 to 600 c.f.m.) 8" Fan, wt. 4 lb. **\$5.95**, 10" Fan, wt. 6 lb. **\$8.95**, 12" Fan, wt. 8 lb. **\$9.95**.

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(Item 23) Fits into chuck of any electric or pneumatic drill or flex. shaft. Operates at any angle in a full 360° arc. Makes possible drilling, grinding, carving, routing, etc. in close cramped quarters. Makes impossible jobs easy. Made by Kett Tool Co. Complete with built-in chuck and adjusting key. Hardened alloy gears. Precision built for heavy duty. Lists at \$39.95 — while they last **\$9.95**.



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FRAM OIL FILTER

(Item 12) Model F21. Big 73 cu. in. size. Ample capacity for all cars, trucks, tractors. Universal bracket, standard openings. Fram filters are tops. Easy to install. Wt. 8 lbs. Usually \$7.95—now **\$3.75**.



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(Item 17) Heavy Masonite, with self-adjusting spring hinge to hold up to 100 sheets of 8 1/2" x 11" paper. Push back cover for instant release. Flip cover shut and notes or drawings are protected. Perfect for pilots, engineers, students, artists, truck drivers. Wt. 2 1/2 lbs. Usually \$2.95. Spec. **\$1.10**. 2 for \$2.00.

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Don't take chances. Luma-Rim, the red circle, reflects light from all angles, throwing off bright red glow. Colorfast, made from finest reflective material. Precision cut. Easy to apply. Lasts for years.

Be sure to state if for 15 or 16 inch rims. Postage pre-paid per set (for 4 wheels) **\$2.95 ONLY**.

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Pacific Bldg. Oakland 12, Calif.
*See article page 98 December 1950 Popular Mechanics

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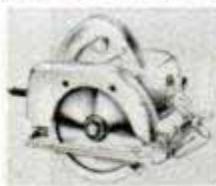


*I built my own Garage
on weekends with*

SKIL **Home Shop Tools**

A new porch, an attic room, needed repairs, are easy and economical with SKIL Home Shop Tools!

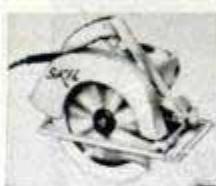
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6 inch Saw**
Bevel cuts! Adjustable— $\frac{3}{4}$ " to $1\frac{1}{8}$ "
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Saw Table**
Converts SKIL Home
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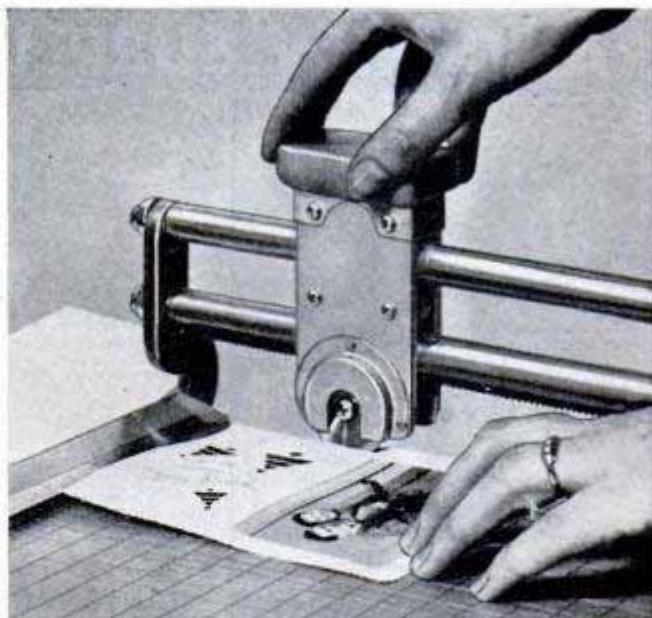
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City..... Zone..... State.....



Rotary Paper Trimmer

Instead of a long knife blade, a new paper trimmer has a rotary cutting wheel which is pushed along a geared rail. Fastened securely to the right edge of the trimmer are twin guide rails. As the trimmer is pushed along the rails, gears rotate the cutting wheel, which is mounted on ball bearings. The wheel is self-sharpening as it moves along a steel cutting edge.

Mineral-Spirits Spray

Weeding costs in evergreen nurseries sprayed with mineral spirits have been cut 90 percent, according to J. H. Stoeckler of the Northern Lakes Forest Research Center, Rhinelander, Wis. It is applied at 50 to 100 pounds' pressure and at a rate of 14 to 75 gallons an acre, depending on the ages and species of the evergreens. The spray is particularly effective in seedbeds of pine, fir, juniper and spruce, where hand picking is usually done.

Potato-Chip Factories Consume 1/12 of Produce

When one-twelfth of all the potatoes eaten are used for making potato chips, it has become big business. After the potatoes are pared and sliced mechanically, they move on an endless belt through two tanks of melted fat, one at a much higher temperature than the other, thus searing the thin slices in the hotter fat and then completing the job at a lower temperature. The procedure would be tedious and difficult for the home maker of chips.

More than 70 percent of the families in the U. S. own automobiles, according to the Automobile Manufacturers Association.



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For a quick, easy job, try WONDER-PASTE! Applied with a paint brush, it quickly reduces the toughest finish to a soft, pulp-like mass that EASILY PEELS OFF with a putty knife! Leaves a smooth, clean surface, requiring no sanding. Safe for wood, metal, fabrics and hands. Long a favorite of professional painters. At leading paint and hardware dealers.

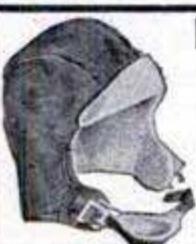
Write for leaflet on
WONDER-PASTE

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Cordovan brown leather NAVY Aviators helmet with warm fleece lining. Brand new. Detachable chin strap. Perfect for cyclists, flyers, farmers, hunters . . . all outdoor wear. Children love them! Best helmet service had. Cost Gov't. \$10.00. Sizes small, medium, large. Send check, cash, M.O. COD's plus postage accepted. Money back guarantee.

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COMPLETE \$2.95 WITH FILE

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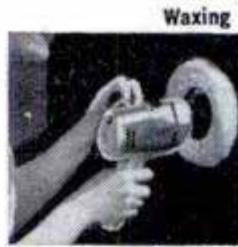
MAKE A CIRCULATING HEATER OUT OF YOUR COOK STOVE with "EVEN-TEMP"

Heat Waves
Cold Air Intake

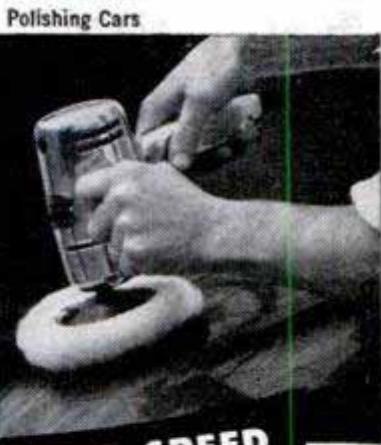
Just set "Even-Temp" on Gas, Oil or Electric stove or hot plate, circulates warmed air high and low, eliminates cold spots, warms room for baby's bath. Lightweight aluminum, attractive, portable. Even-Temp cuts down fuel bills!

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Money-back guarantee, send cash with order.

NEFF EQUIP. CO., 510 PETROLEUM BLDG., WICHITA, KS.



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Polishing Cars

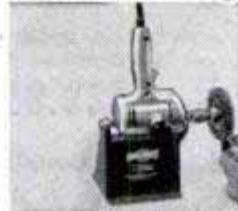
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There's almost no end to the jobs you can do with a Home-Utility Sander - Polisher! It comes *complete* with sanding discs, lambswool bonnet, $\frac{1}{4}$ " drill chuck, cans of polish and wax. It drives many other inexpensive attachments for grinding, sharpening, buffing, burnishing, cleaning. It has an extra-powerful motor for high-speed work from AC or DC outlet. It weighs only $3\frac{1}{2}$ lbs., easy for the whole family to use. And it's quality-built by BLACK & DECKER, world's largest portable electric tool maker. Try it at your hardware, electrical appliance or implement dealer's or department store.

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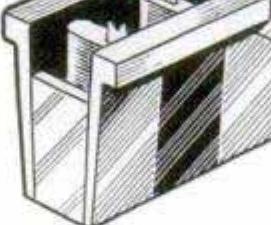
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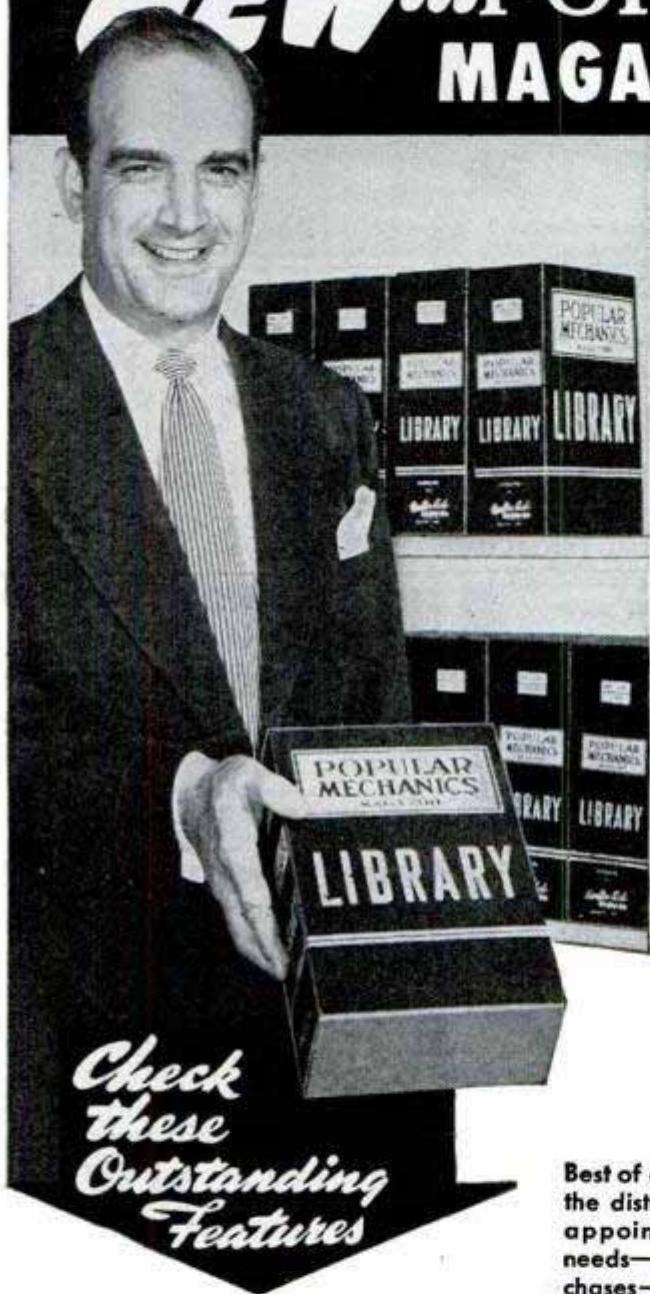
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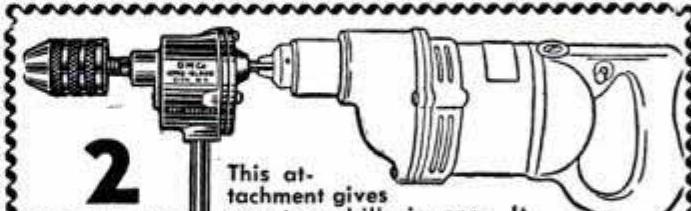
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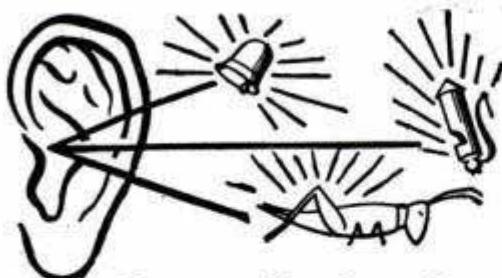
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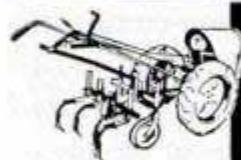


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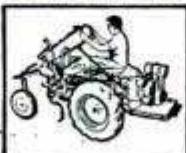
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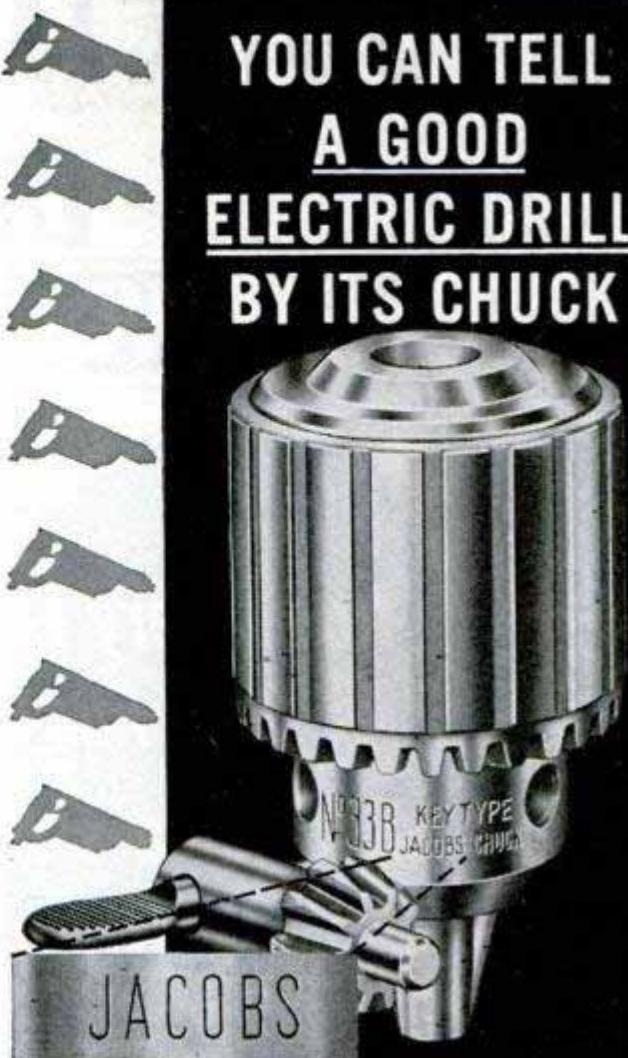


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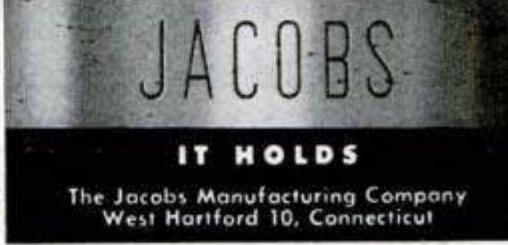


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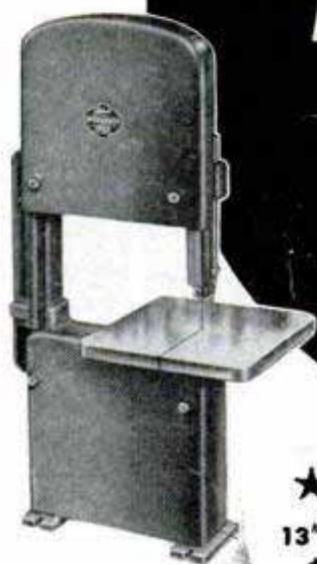
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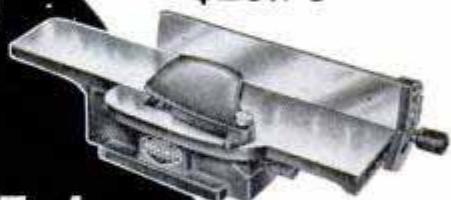
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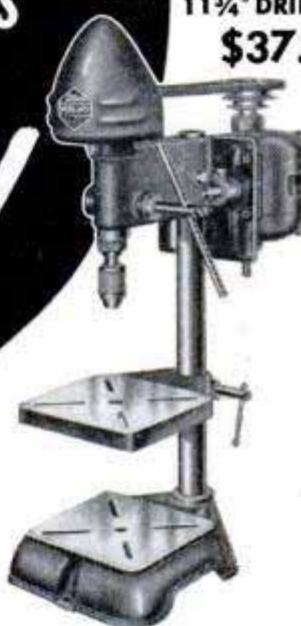


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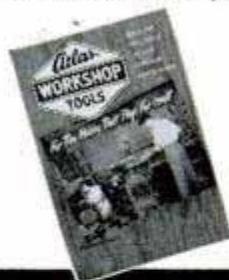
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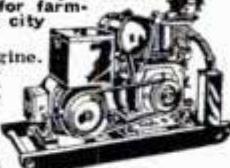
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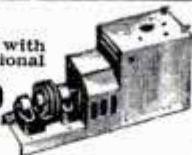
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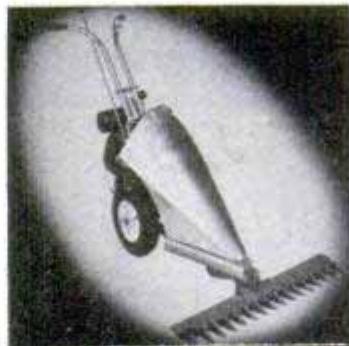
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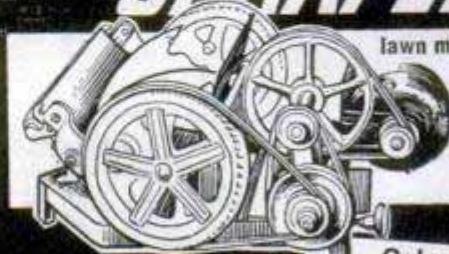
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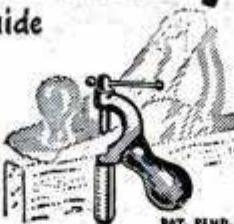
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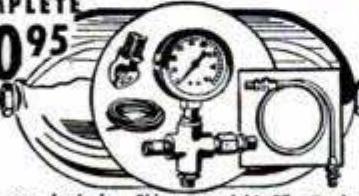
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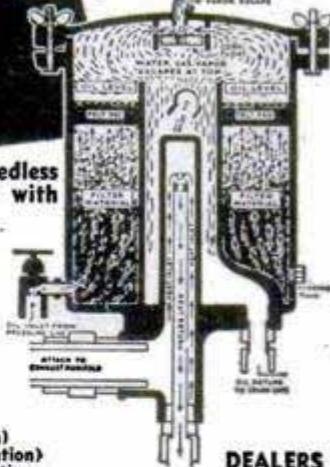
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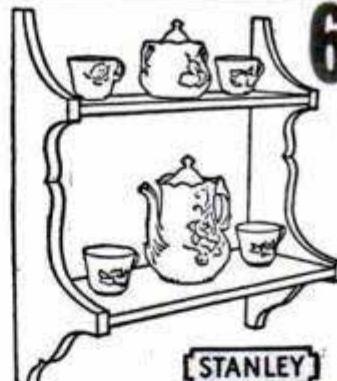


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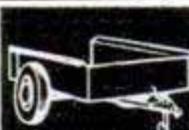
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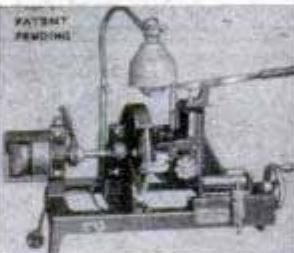
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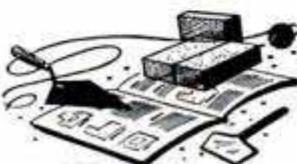


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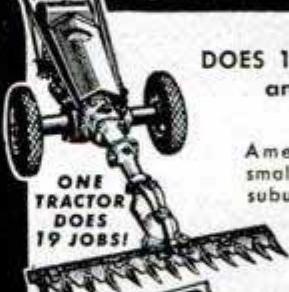
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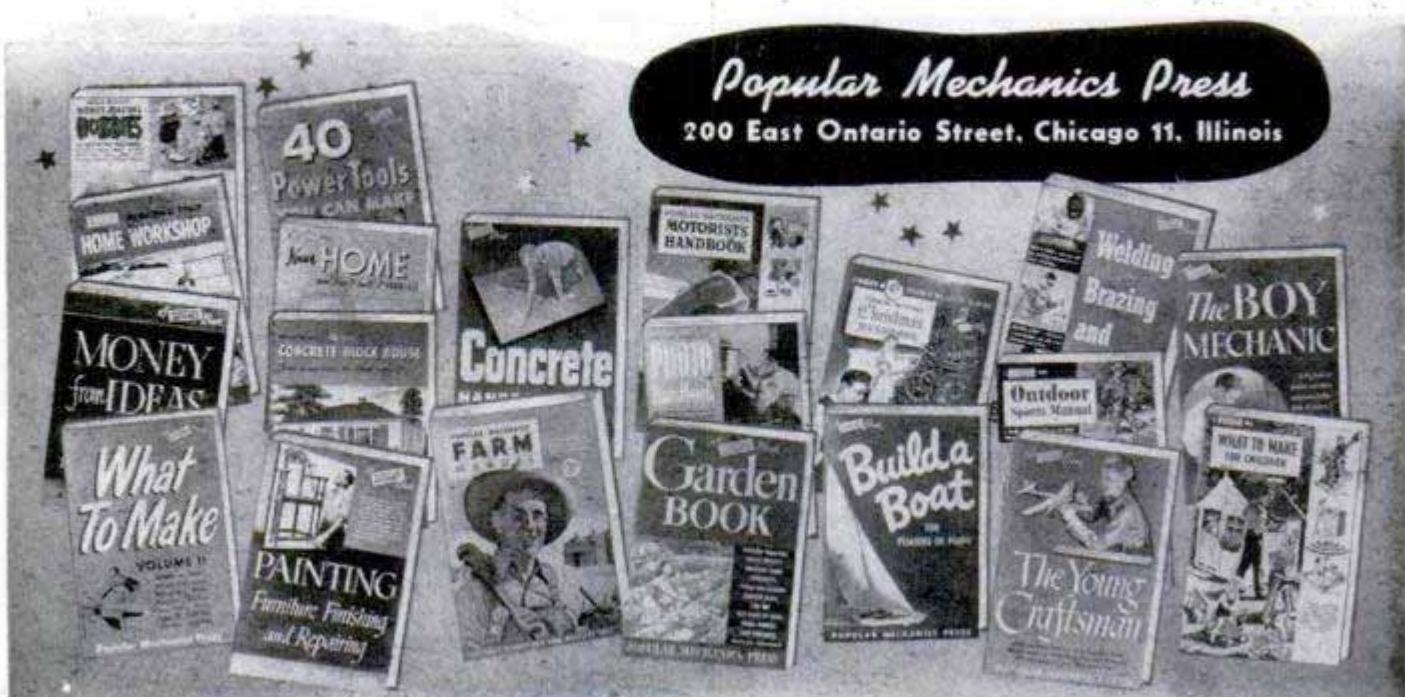
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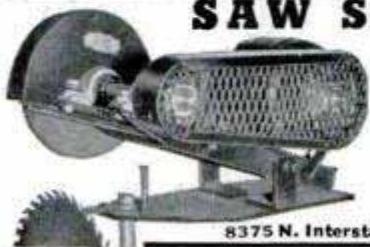


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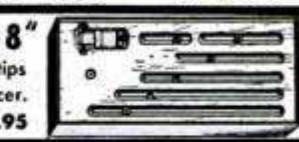
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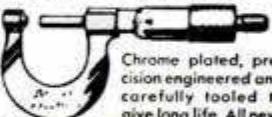


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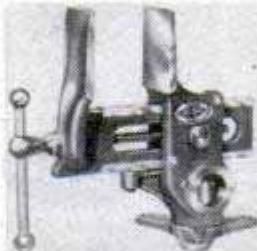
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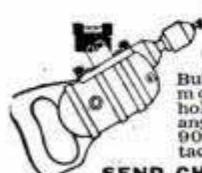
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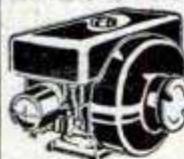


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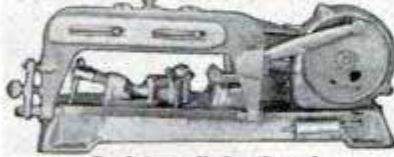
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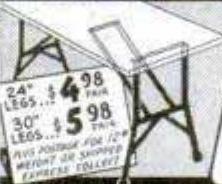
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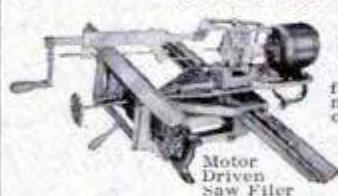
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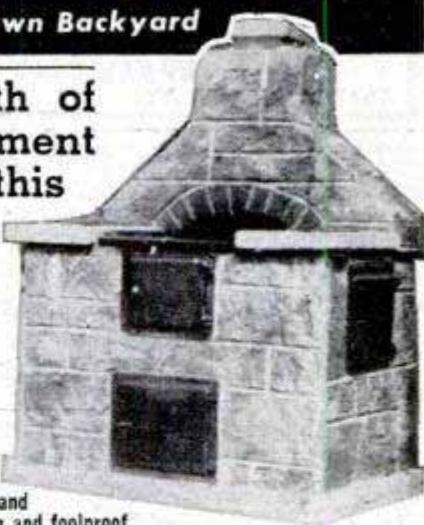
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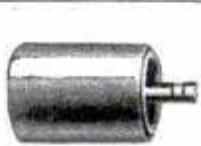
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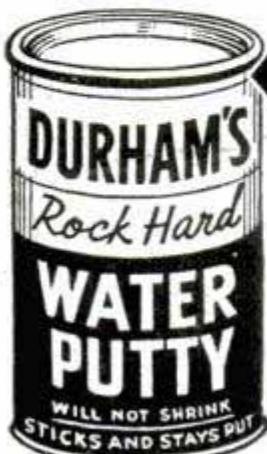
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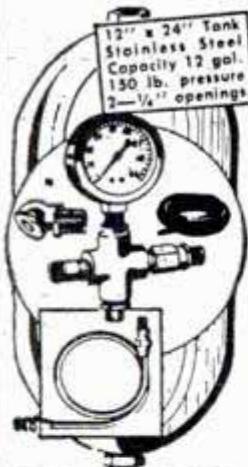
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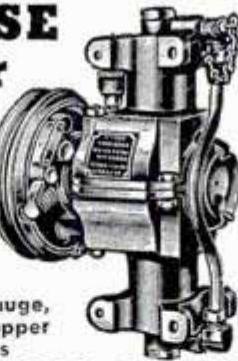
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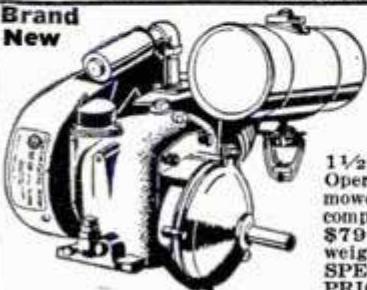
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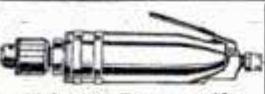
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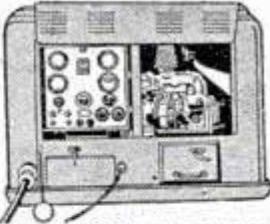
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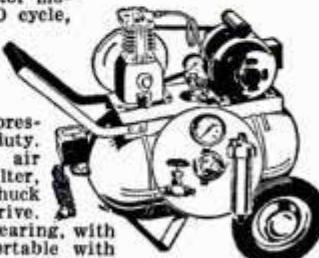
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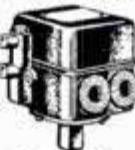
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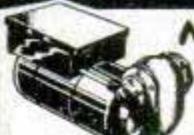
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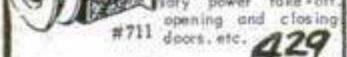


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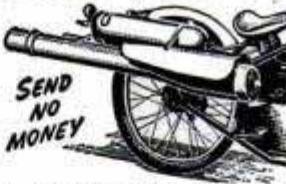
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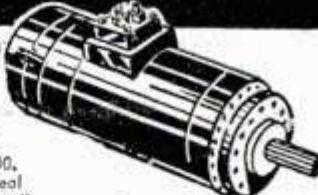
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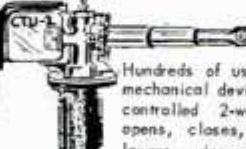


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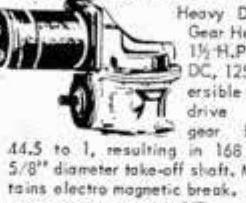
MOTORS



LEAD ELECTRIC MOTOR, 24 volt, 6 amps, series wound reversible motor with over-load clutch. Motor turns 11,000 R.P.M. Has 11 to 1 gear reduction box turning 1000 R.P.M. at take-off. Adaptable to flex or rigid drive. Limit switch box. Size 10" x 4". **5795**

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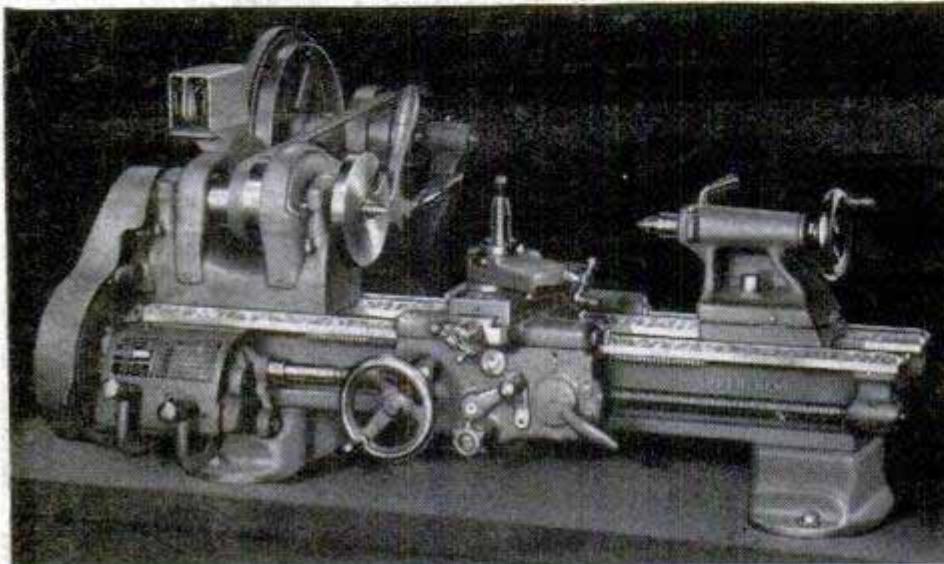
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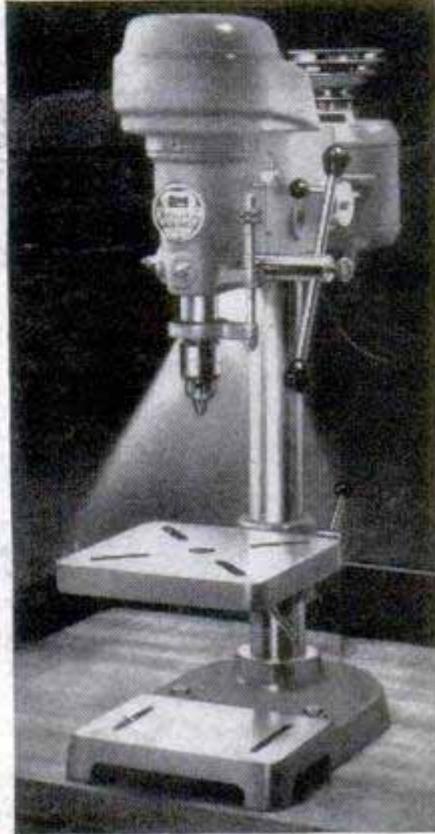


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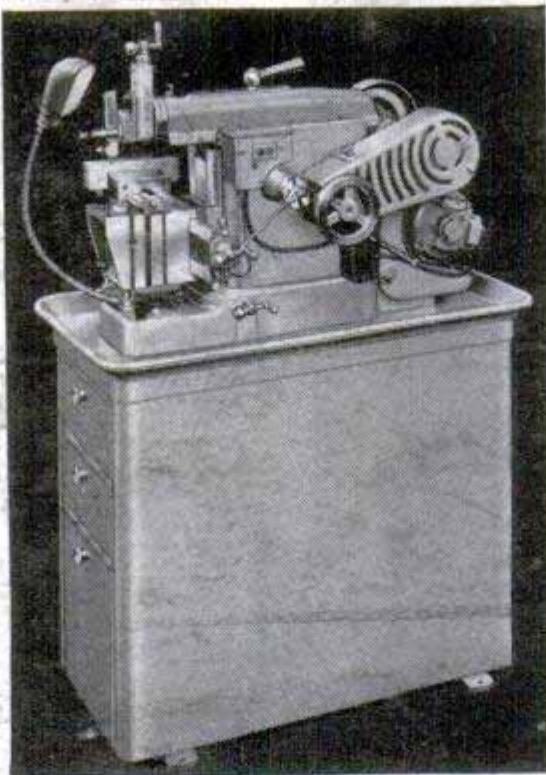


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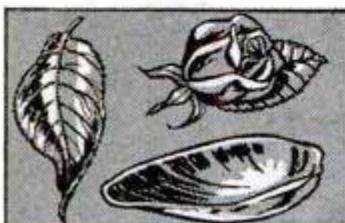
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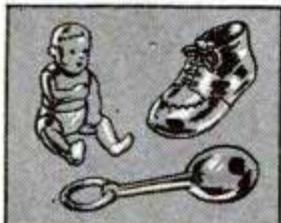
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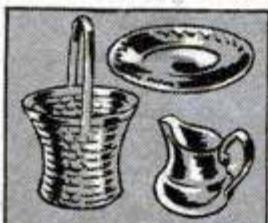
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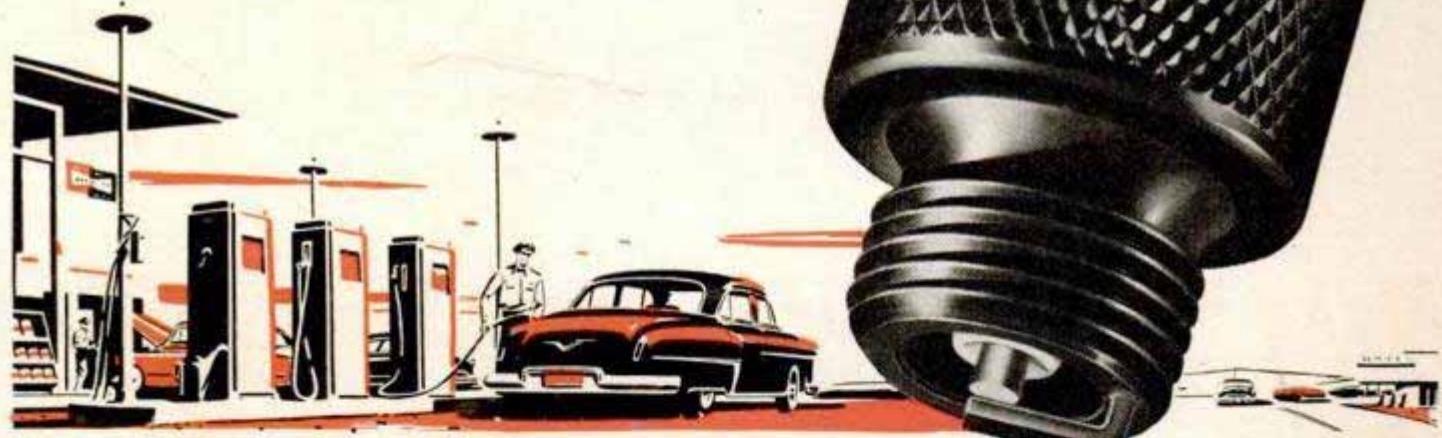
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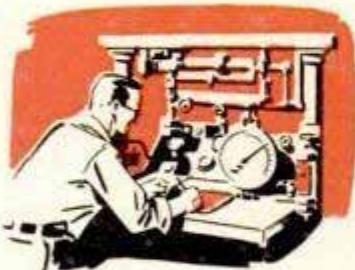
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